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..THE..
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G. C. SAVAGE, M.D., Editor and Publisher.

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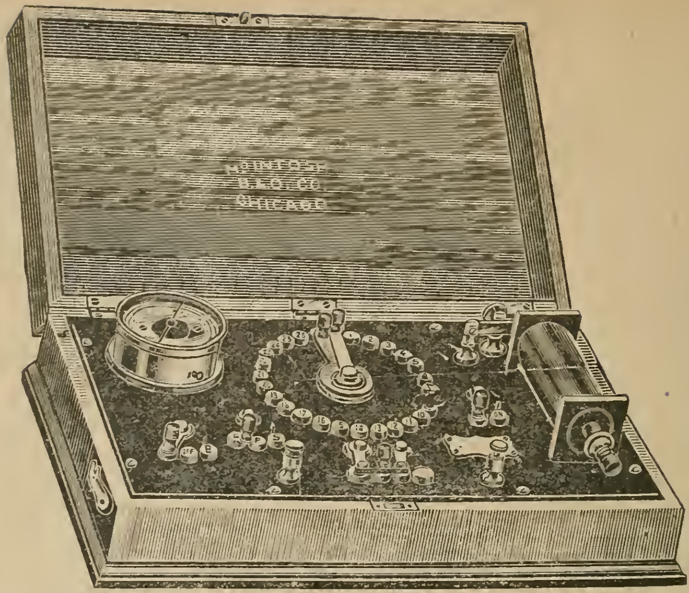

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THE
OPHTHALMIC RECORD.

VOL. V. JULY, 1895. NO. 1.

SCIENTIFIC PROCEEDINGS OF THE SECTION OF OPHTHALMOLOGY, A.M.A., BALTIMORE MEETING, 1895.

Papers in abstract, discussions in full.

Meeting was called to order at 3.10 p. m. May 7, by the chairman, Dr. Ed. Jackson, who immediately delivered the annual address, his subject being "THE STRENGTH OF THE DIFFERENT MYDRIATICS AND MYOTICS." No abstract of this address has been furnished.

INCIPIENT CATARACT.

By ALBERT R. BAKER, M. D., of Cleveland, Ohio.

Dr. Baker believes that there is a nephritic as well as a diabetic cataract. He reported two cases of diabetic cataract, in which there was marked improvement in vision, and one of nephritic cataract, in which vision improved for a period of five years from $\frac{20}{200}$ to $\frac{20}{50}$.

That many cases of cataract are due to local pathological conditions of the eye itself, he could not doubt, and might be improved by either local or constitutional treatment. He thought these cases were too frequently dismissed with the advice, "wait until the cataract is ripe," and that the profession do not give them the same careful study they do many other diseases.

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He suggested in conclusion that in all cases of incipient cataract: (1) the urine should be examined chemically and microscopically; (2) the general health should be carefully interrogated; (3) all errors of refraction should be corrected; (4) a careful examination of the fundus oculi should be made; (5) that the patient receive such general and local treatment as may be suggested by the above inquiries; (6) that a few carefully reported histories of cases from incipiency to maturity would be of more value than statistics of hundreds of successful operations; (7) that if operative interference becomes necessary it should be instituted at the earliest possible moment before the general health becomes impaired, preferably by Knapp's method of peripheral capsulotomy, with an iridectomy either at the time of the operation or some time previously.

THE OPERATIVE TREATMENT OF IMMATURE, AND SOME FORMS OF ZONULAR, CATARACT.

By Dr. JOHN E. WEEKS, of New York.

He stated that the most favorable time for the removal of cataract was at the period when the lens fibres had been separated from the lens capsule by the formation of liquor Morgagni between them. A stage of swelling was spoken of as existing in the formation of soft and of rapidly developing senile cataract, but was said not to exist in the cases of nuclear cataract and of sclerosed lens. Swollen lens fibres were not found to be easily detachable from the lens capsule. In many cases in the formation of ordinary senile cataract, vision may become reduced to $\frac{20}{100}$ or less, at which point it may remain for a long period of time. This stage is distressing to the individual as it renders him unable to perform the ordinary duties of life, and may entail hardships on the patient or patient's family.

The author's experience in the removal of non-cataractous lenses at the dead house, led him to conclude that all cataractous lenses occurring in individuals twenty-five or more years of age could be removed with comparative safety, as soon as the opacity had progressed sufficiently far to interfere with useful vision.

Förster's operation for the ripening of immature cataract was tried a number of times but was abandoned, as it was found that the lens cortex, although opaque, was still somewhat adherent to the capsule and the removal of the cataract, after Förster's operation, was attended with as much difficulty as was experienced in removal without this operation. It also carried with it the chances of inflammation and bad results incident to the additional operation.

The operation, attempted by the author of the paper, in all uncomplicated cases, was simple extraction. As much cortical substance as possible was removed by external manipulation.

Lavage was seldom resorted too. If a small amount of lens cortex remains in the eye, it becomes absorbed and produces no inflammatory trouble. The author has never seen inflammatory conditions awakened by the presence of cortical substance in the eye, after removal of immature cataract.

Twenty-five cases of extraction were reported, divided as follows:

Immature, soft cataract—three. Zonular cataract—five.

Immature, complicated cataract—four. Immature, diabetic cataract—one.

Immature, senile uncomplicated—twelve. There were no losses.

Iridectomy was done in six cases. Simple extraction in nineteen cases.

There was one prolapse of iris. Discission of secondary cataract was done in twenty cases.

The ultimate results were:

$\frac{20}{20}$ or better, thirteen cases.

$\frac{20}{30}$, two.

$\frac{20}{40}$, three.
$\frac{20}{50}$, two.
$\frac{20}{70}$, five.

The results appeared to the author to be as favorable as those obtained by the removal of cataract at the stage of maturity and the relief to the patients, by quick restoration of vision, was very great. Such operations should be done by expert operators only.

DISCUSSION.

Dr. George E. Frothingham, Detroit, Mich.: In regard to the paper of Dr. Baker I will say that I agree in the main fully with the views of the author. While I think it is the experience of most of us that any considerable opacity of the lens never fully clears up, slight opacities may nearly disappear: and that we find commencing cataract at times due to malnutrition of the lens, dependent upon disease of the choroid or some constitutional disease that may be relieved, and with the effort to retard or arrest the development of the cataract. I remember one case in my practice in which the development of a cataract, evidently due to choroiditis, has apparently been arrested; at any rate it has made no progress for about seven years. With the conclusions in Dr. Baker's paper I fully agree. They are in accordance with the general principles that in incipient cataract we should make a careful and thorough examination of the eye and of the general condition of the patient, and remedy any pathological conditions so far as we can. In regard to the paper of Dr. Weeks, it deals with a most important subject. Fortunately, we are not often called upon to hasten the maturity of cataract. In some cases, however, where both eyes are about equally affected and advance very slowly and the condition of the patient will not allow of waiting for the natural process of ripening, we are forced to decide between extracting an immature cataract or attempt to hasten the maturity by some operation. Of the various operations that have been devised I think that Förster's is the best and safest. Although it will sometimes fail to hasten the progress of development, it is attended with very little danger. It will lead to iritis in a certain per cent. of cases, but the worse result I have ever seen was a slight synechia. The pupil should be kept well dilated after the operation until all danger has passed. If the operation fails to hasten maturity it will allow of the extraction of the immature cataract with the greatest possible degree of safety. If I were the most ardent advocate of simple extraction, I would make an exception in the case af immature cataract. I make in all cases a preliminary iridectomy, and after all irritation has completely subsided, and the eye has perfectly recovered from the effect of the operation, if it has failed to produce ripening of the cataract, I then extract the immature cataract, making a peripheral incision in the capsule as a still further safeguard against dangerous reaction from any lens matter that may remain in the eye.

DR. HERMAN KNAPP, New York: As to heat producing cataract, I know of one case where I produced a cataract by the galvano-cautery point, with which I burned off the apex of a kerato-conus too cautiously, i. e., too slowly pierced the cornea. I wanted to make only a very small puncture in the cornea. I obtained this end, but, a slowly developing yellowish cataract was the result and had to be extracted. Whether outward heat, for instance, in fire-workers, is a notable factor in the development of cataract, I am not prepared to say. About thirty years ago I saw a lens of a diabetic patient rather quickly become opaque, and soon after clear up. The observation, though not fully accurate, has remained vivid in my mind, and ever since that time I have watched the progress or regress of cataract, but the above example has remained the only one, and therefore has no appreciable value. Unripe cataracts not infrequently place us in the alternative of removing a cataract prior to the time when the patient's chances of a good recovery are greatest, or to let a patient wait an indefinite length of time for that most favorable period. The vogue into which the ripening operations have come is thus easily accounted for. They would be a God-send if their action were certain and free from danger. Unfortunately, many an operation for ripening has been done without producing any effect; on the other hand, these operations have proved injurious by provoking iritis and its consequences, and some by a degree of deleterious morbid process (plastic and purulent irido-cyclitis and panophthalmitis). Even if these mild or severe reactions occur only exceptionally, we are mortified to have created, by our own hands, any conditions that dim by complications the chances of the patient, when the chief operation, the extraction. has to be undertaken. I for my part thus far prefer the risk of dealing with remnants by a secondary discission to the double operation of ripening and extracting the lens, which in a majority of cases requires a subsequent division, also, to clear the pupil.

Dr. Joseph A. White, Richmond, Va.: In regard to Dr. Baker's paper on the etiology of cataract, I am satisfied that the explanation of Dr. Risley, attributing the opacification of the lens to disturbance of its nutrition by pathological processes in the uvea, especially the choroid, is correct in a large number of cases, whilst not generally applicable. All of you, as well as I, have examined many cases of cataract after extraction where there was no choroidal disease, nor any other evidence of a pathological process inside the eye, and, consequently, I am satisfied that there are many cases of cataract in which the etiology is to us an undiscovered factor, and that much yet remains to be found out in regard to this subject. Why in one person an opacification of the lens remains stationary, and in another, is progressive, is also a question yet to be solved. That this is true we well know, for in zonular cataract we have it progressive in one, and stationary in another case. Why cannot, therefore, opacification of the lens remain stationary in adults? I know of a case of a young man who received a blow in the eye several years ago, which by contre coup, without wound of the cornea, ruptured the iris at its pupillary edge and also the capsule of the lens in direct line with the iritic wound. A small opacity of the lens developed at this point and to this day remains stationary. Cataract has not followed nor has the opacity disappeared. As to the disappearance of lenticular opacities, I have had very little experience, my only case being the one referred to by Dr. Baker. This case was one with marked anterior central opacity of the lens sufficient to materially decrease vision, and cause a semi-blindness with a contracted pupil. He wished to have the cataract removed and submitted to the ripening process of paracentesis and external massage with great hopes of having a ripe cataract in a few weeks. His next visit showed a decided diminution in the size of the opacity. I triturated the eye again: Result,—three weeks later a perfectly clear lens. Now either this opacity of the lens disappeared or I made a mistake. I don't pretend to say I did not, for everyone is liable to error, but every precaution against an error had been taken. The pupil was gray when it was contracted and there was no ophthalmoscopic reflex with dilated pupil, the fundus was illuminated around the opacity and the vitreous was clear. The opacity moved up and down with the eye, locating it either in the anterior part of the lens or the cornea, and it certainly was not in the latter; hence I concluded that it was a case of partial opacification of the lens that had cleared up; how or why I don't know; what the massage had to do with the result, I am unable to say. Like other sclerosing processes, and I suppose we may so consider cataract, it may come to a standstill or it may even retrograde towards recovery, although such cases are rare. To discuss Dr. Weeks' paper would take more time than allowed me. I have already, however, gone on record to some extent in regard to immature cataract. I presented to this body a paper on that subject several years ago in which I suggested the adoption of a simple process of ripening immature cataracts by paracentesis and external massage without iridectomy, because I had had bad results in Förster's operation from iritic processes. I reported a number of cases then, and have done others since, and I have had exceptionally good results,—no bad ones. I have been lucky I suppose. Like Dr. Knapp, I think the less traumatism an eye is subjected to the better, and hence I never ripen an immature cataract if the case will wait for nature's processes, and then only if the patient is under sixty years of age, because I thereby break up and loosen the cortex from the capsule simplifying the extraction. Over sixty years of age I extract without waiting for maturity, but it is difficult to say what the latter signifies as it does not mean the same to each one of us. For instance, a patient may be too blind to move about without assistance, and the cataract be still immature; and, again, sight enough to see large letters may be present, and the cataract be perfectly ripe This especially applies to those amber-tinted cataracts in old people which never become perfectly opaque and hence relatively are immature, whilst in reality they are perfectly ready for extraction.

Dr. J. L. Thompson, Indianapolis, Ind.: I simply wish to say that I have seen a well marked unmistakable case of cataract disappear spontaneously. I had every opportunity of watching it for years before, and several years, also, after the clearing up of the lens. As I have published the case with all of its complications, I shall only add that this case of spontaneous cure of a cataract by liquid degeneration within the capsule was more clear to me than is the well-known fact that this world of ours revolves upon its axis.

Dr. Jas. A. Lydston, Chicago, Ill.: A few points bearing on the subject matter as presented in the paper, suggested themselves as the paper was read and discussed. First, I believe that we go a little too far in assuming, in all cases in which lenticular opacities disappear, that we have a true cataractous formation, for we know that cataract exhibits a process peculiar alone to itself during the formation stage and indeed one that is quite characteristic. Becker has done more to enhance our knowledge with respect to cataract than any other investigator in this line, and he has shown that, primarily, cataract forms by the formation of vacuoles as little air chambers distributed through the lens structure, and that these subsequently become filled with fluid of a different density from the remaining lens substance, and, finally, there is a separation of the nuclear and cortical portions of the lens from the lenticular capsule constituting light cataract. Now, in many instances in which lenticular opacities disappear spontaneously, it seems that we are not confronted by a true cataractous formation. Still we have opacities as occurring in cases in which the capsule has been punctured and subsequently closed. Here we may have spontaneous disappearance. But I seriously doubt the propriety of accepting the statement that any form of diabetic cataract ever spontaneously disappears. As we know such changes only assert themselves in the later stages of diabetes when our case is almost beyond redemption. We have cataract arising from large doses of naphthalin or ergot and those arising from concussions etc., and it seems that possibly these are the types of cataract, erroneously so called, which are capable of spontaneously disappearing and which are all grouped under the heading of incipient cataract.

Dr. F. C. Hotz, Chicago, Ill.: My experience with the ripening processes of immature cataracts has not been satisfactory. In some cases no change in the lens was produced; in a number of cases the manipulation was followed by more or less decided cyclitic irritation. I have since many years given up all attempts at ripening, and have not felt induced to return to the attempt, even by the favorable report Dr. White gave of his cases at the Detroit meeting. As to the extraction of immature cataract, I find the operation does not involve greater danger than the removal of a fully matured cataract, provided there is not a very large amount of absolutely transparent lens matter. But where this is the case, the patient's vision is usually still so good that there exists no urgency for an operation. In the slowly progressing opacification which starts in the cortex and therefore early causes great disturbance of sight, the lens seldom, if ever, becomes absolutely opaque. It appears quite opaque at focal illumination, but proves transparent for the ophthalmoscope so that the fundus can be seen although through a mist. In this form of cataract the whole lens is a piece of yellowish jelly and it comes out in toto, leaving a clear pupil, and the healing is as smooth as after the extraction of a ripe cataract.

DR. S. D. RISLEY, Philadelphia, Pa.: Dr. Baker has very courteously noticed my published observations regarding the etiology and treatment of incipient cataract. I rise to call attention to a single point in which he has failed to interpret quite correctly some ambiguous sentences in my paper on the subject. While in the eighty cases of incipient cataract there reported, it seemed the treatment addressed to the choroidal disease has arrested the progress of the opacification of the lens, I think it is stated there that in no case had I witnessed the disappearance of opacities already formed.

Dr A. J. ERWIN, Mansfield, Ohio: At the Detroit meeting in 1892, I read a paper on this subject, in which I brought forward ten cases that I had treated in periods of from four to ten years previous to that time, in which there had been no increase of the opacity from the time treatment was begun. Since then one-half of those cases have died, and none of them required an operation of any kind for cataract during life. Four are living and under my observation; one has disappeared. In these four cases no increase of opacity has occurred yet. In one-half of the cases there was at least one opaque lens,—mature cataract. I think that some of them belong to that class of cases that never intend to mature. There was not much improvement, although some amount of vision in nearly every case, but there appeared to be a complete stopping of the advancement of the opacity. My treatment as I gave it on that occasion, was iron tonics, cleansing and iodine applications about the eye. I have made up my mind since, that the application of weak solutions of iodine, applied daily, in some cases is the most important part of the treatment, and that the best solution is that of about one-half the strength of the officinal tincture.

Dr. DUDLEY S. REYNOLDS, Louisville, Ky.: It is unfortunate that gentlemen who speak of stationary opacities of the lens, fail to state more definitely the character and precise location of those areas of opacity. We are all familiar with the peripheral opacities of the lens observed in childhood, and remaining nearly stationary through life to advanced age. Traumatic opacities of the lens often remain distinctly circumscribed for years. I have in mind the case of a student who has a foreign body encysted in the upper portion of the lens, midway between the periphery and the vertex, and which has remained more than four years without any disposition to increase opacity beyond the small area of the wounded portion.

Dr. J. E. WEEKS, New York: I am very glad to hear the expressions given against the artificial methods of ripening cataracts. I think it will not be long before such methods will be entirely abandoned.

PRACTICAL POINTS IN ANESTHESIA FOR PLASTIC OPERATIONS ABOUT THE EYE.

By M. W. ZIMMERMAN, M. D., Philadelphia, Pa.

1. Plastic Surgery about the eye requires complete and prolonged Anesthesia with the minimum of risk to the patient, and which can be induced without impairing the life of the tissues, or infecting the wounds.

2. Ether, among general anesthetics, best meets these demands. The method of administration should be simple, cleanly, and avoid encroaching upon the field of operation.

3. Cocaine is the only suitable local anesthetic. For the conjunctiva it may be applied to the surface in 2–4% solutions. When the skin is involved, sub-cutaneous injunction becomes necessary. The punctures should be few, and the dose not exceed 2½ grains.

SKIN-GRAFTING ON THE EYELIDS.

By Dr. F. C. HOTZ, Chicago.

Skin-grafting finds a great field in operations for ectropion and entropion.

SKIN-GRAFTING IN ECTROPION.

For a perfect reconstruction of the eyelid, it is very essential that the new substitute possesses all the important attributes of the normal lid-skin. Thiersch's epidermis grafts furnish the desired material, and are far superior to skin flaps of any kind. The grafts are cut with a razor, and directly transferred to the wound of the lid, where they are carefully spread out smoothly. When the whole wound is covered with grafts, two layers of silk protective are put over them; one layer is placed transversely, the other layer longitudinally; over these strips comes a compress, which is to be kept wet with a half per cent. solution of salt. Finally, both eyes are closed by a bandage to insure absolute rest during the healing process. It is also important that the operated lid should be fastened by ligatures, the upper lid to the cheek, the lower lid to the forehead. After 4 or 5 days the good eye is left open; and after the first week the ligatures are removed, and no bandage is needed any more.

SKIN-GRAFTING IN ENTROPION.

In the extreme degrees of entropion it is easier and better to construct a new border than to turn up the inverted border. For this purpose the lid is split by the inter-marginal incision into an anterior edge (containing the eyelashes) and a posterior edge. When the anterior edge is drawn up so that the eyelashes recover their correct position, there is a gaping groove-like wound which is to be filled with a wedge shaped skin graft. Binocular bandage for 24 hours; if by this time, the graft is adherent, the success of the operation is assured; if the graft is still movable, it is dead and useless.

I prefer the true skin grafts for the reconstruction of the lid border to Thiersch's epidermis grafts, or to the use of mucous membrane; and judging from my experience, I regard the fear that hairs might grow in them, as groundless. I have never seen any hairs grow in such grafts, and I am inclined to believe that if hairs are found afterwards, they do not grow in the graft, but in the posterior edge of the lid border; they are eyelashes which the operator left in the posterior edge when he made the inter-marginal incision.

TRANSPLANTATION OF A STRIP OF SKIN INTO THE INTER-MARGINAL SPACE OF THE LIDS.

By H. KNAPP, M. D., New York.

In severe cases of entropion and trichiasis good results can be obtained by an implantation of skin into the inter-marginal space of the lid. The steps of the operation are as follows:

1. Ordinary canthoplasty.

2. Incision of the inter-marginal space, according to Jaesehe-Arlt.

3. Curved incision of the skin, three to four mm. above the ciliary border. Removal of a small strip of muscle along this incision.

4. Grooving of the tarsus according to Streatfield.

5. Passing sutures through the lower lip of the wound, the upper edge of the tarsus, and the skin of the upper lip.

6. Detaching from the upper lip of the wound, with a straight pair of scissors, a strip of skin 2 mm. broad, as long as the incision in the inter-marginal space, and implanting it into the gaping and cleansed incision. Sutures may be used but are not essential.

7. Tying these sutures, four or five in number, the threads may be cut short or stretched and fastened to the skin above the brow by collodion (Panas), or stripes of plaster (Born), if the free edge of the lid is not sufficiently everted.

8. Dressing with bichloride gauze, greased with a salve, or leaving the eye uncovered.

9. Cutting the sutures in from three to five days, cleansing the eye every day, gently so as not to disturb the implanted flap, which in almost every case unites in its whole extent.

This plan of operating is to be simplified or modified according to the condition of the case.

SOME CASES OF RESTORATION OF EYELIDS BY PLASTIC OPERATIONS.

By HERBERT HARLAN, M. D., Baltimore, Md.

"A case of cancer involving eyelids and side of nose. Operation, exhibition of patient after three years," by Herbert Harlan, of Baltimore.

Dr. Harlan's paper was the relation of a case of extensive epithelioma of inner end of eyelids and extending to side of nose, and involving the lachrymal canals and sac. It was freely cut out, and a large flap turned down from forehead. Chloroform anesthesia was used. The operation had been performed more than three years before. The patient was exhibited showing excellent result.

DISCUSSION.

Dr. R. A. Reeve, Toronto, Canada: My experience with the transplantation of flaps without pedicle was given at the Canadian Medical Association in '79, I think. The first one was largely a failure. The technique was not at fault, but the patient had psoriasis, and there was hardly enough healthy looking skin on the body to suffice for a flap. As, however, there was ulceration of the cornea from exposure, I operated. Another case of double cicatricial ectropion proved very successful. I think it is impor'ant to maintain the union of the lids for a long period, so as to diminish the ultimate shrinkage of the flap. In another case the lids were kept united for several years, though sufficiently open to permit useful vision. The patient had naught but cicatricial tissue from the chin to the nape of the neck. There was complete ectropion of all the lids with keloid cicatrices. In using a flap without pedicle in order to permit wearing of an artificial eye, it is desirable to implant it as centrally as possible so as to get the minimum contraction. Blepharoplasty by horizontal sliding flaps has given me gratifying results in a number of instances.

Dr. H. V. Wurdemann, Milwaukee, Wis.: Referring solely to the first paper under consideration, I will say that there will soon come a time when *water* not *ether* will be deemed the only suitable anesthetic for nearly all operations connected with the skin. The injection of cocaine in percentages over .2 (2–10) per cent. (not 2.%) is harmful not only to life itself but to the life of the skin flap. Injections in higher solutions are radically dangerous and should be abandoned in favor of infiltration anesthesia by injection of harmless fluids into the tissues. I will not occupy your time at this moment by any further reference to the matter, which I will sufficiently elaborate in the session of Thursday morning.

Dr. D. S. Reynolds, Louisville, Ky.—I would like to have the last sentence of the first paper re-read.

Dr. M. W. Zimmerman, Philadelphia, Pa.: Cocaine is the only suitable local anesthetic. For the conjunctiva it may be applied to the surface in 2 to 4 per cent. solutions. When the skin is involved, sub-cutaneous injections become necessary. The punctures should be few, and the dose not exceed 2 ½ grains.

Dr. Reynolds: I noted that point and wanted it repeated that it might be thoroughly understood. I have seen a single drop of the 4% solution applied to the conjunctival membrane, produce almost instant pallor with cessation of the heart beat. I have noted a dangerous reaction repeatedly, and it has been referred to by others.

Dr. E. J. Bernstein, Baltimore, Md., exhibited a patient. When first seen, she had lost both upper and lower lids and the entire nose by syphilis, and had a beginning ulceration of the cornea due to lagophthalmus.

Dr. Lucien Howe, Buffalo, N. Y.: In regard to putting the flap in hot water, it would seem to me to be entirely unnecessary, when the transplantation is made without difficulty. Promptitude seems of considerable importance.

Dr. J. P. Worrell, Terre Haute, Ind.: I have made a number of grafts introducing skin from back of the ear, or more frequently, mucous membrane from the lip. It is rare that one fails to get union. Where there was entropion, I did not find it necessary to make that graft. It has seemed to me that if you can make an operation somewhat like Dr. Hotz's with the incision posterior to the ciliary margin, we shall get such a contraction that we will not have a return of the entropion. I have some cases, operated upon some years ago, and the results are still satisfactory. I dissect down the skin absolutely to the ciliary margin, and remove all of the palpebral part of the muscle, stripping the cartilage entirely. From the cicatrization that follows, I have never yet had reversion to the entropic condition. I always do these operations under cocaine, and have never yet seen a single case of injury from its use. I am inclined to think Dr. Reynolds' case due rather to shock, than to cocaine.

Dr. P. D. Keyser, Philadelphia, Pa.—He exhibited a photograph of a case of transplantation for epithelioma of inner canthus, operated upon by him over one year ago successfully, and in which there has been no return of the entropion. He found, too, that grafts take equally as well on cicatricial tissue as any other.

Dr. S. D. Risley, Philadelphia, Pa.—I have now quite a group of interesting lid cases, in which I have done the grafting operation and I expect good results, even though the cartilage has been usually involved. I take the graft from the forearm, as described by Dr. Hotz. I do not think there is any call for more serious operation.

Dr. G. C. Savage, Nashville, Tenn.: It is not often necessary to do extensive or bloody operations for entropion and trichiasis, nor can it often be necessary to transplant skin in an intermarginal incision. By means of the entropion forceps devised by myself, the blades of the forceps terminating in a stirrup as wide as a diseased lid is usually long, with a shoulder extending up each arm of the stirrup for one-eighth of an inch to compress the lid margin, a bloodless and effective operation can be done. When the lid has been grasped by passing one blade of the forceps beneath, the other on the outer surface of, the lid, it is easily inverted and held in position. At least one-eighth of an inch of the lid margin is included in the fenestrum. The forceps are closed tightly by means of a sliding clamp, and the pressure thus exerted, makes the operation bloodless. The knife is used first for making the Burow incision the entire length of the tarsal cartilage and through all structures down to the skin, and one-eighth of an inch from the free margin. This done, a vertical cut is made from either end of the Burow cut, in the lid margin through all the structures down to the skin, and two similar cuts are made at equal intervals between these. The operation thus completed the forceps are removed, when of course there follows a good deal of bleeding. The Burow incision widens the lid; my vertical cuts lengthen it; and the two together effect a complete out-turning of the lid margin. One or more times daily the lid should be slightly everted, so as to make the wounds gape widely, that the deposit of new tissue may be as abundant as possible. The operation is easy and its results effective.

Dr. Frank Allport, Minneapolis, Minn.: In view of the fact that we have in the operation of Dr. Hotz a procedure almost universally successful for the relief of entropion, it seems hardly necessary to multiply operations. I have used this process for fifteen years, and have been almost universally and permanently satisfied with the results. In extreme cases it is usually necessary to combine with it a suitable canthoplasty, and when thus applied there are but few cases in which satisfaction will not be achieved. It is an operation requiring exactness and deliberation, and where failures are noted, it may be because these elements are wanting.

Dr. Hiram Woods, Baltimore, Md.—In an operation for upper lid entropion, performed yesterday by Dr. Savage as he has described his operation, the primary results were excellent. As Dr. Knapp says, many cases show this good primary result, but later relapse. This seems specially true of the Arlt opera tion. Green's operation has been used a great deal within the past few years at the Presbyterian Eye and Ear Hospital with excellent permanent results, as observed in cases two or three years old.

DR. HERMAN KNAPP, New York: I want it understood that the mode of operation which I have sketched refers in its whole extent only to extreme cases. Canthoplasty is necessary in many cases, because by a general shrinkage of the conjunctiva and tarsi, a more or less marked blepharo-phimosis is present. When the tarsus shows extensive cicatrical contraction on the conjunctival side, and irregular thickening and curving in its body with no inter marginal space preserved, the excision of a wedged shaped slice on the outer part of the tarsus and the restoration of the inter-marginal space is indespensable. The strip of skin can be most conviently taken from the upper border of the elliptical wound, when the sutures are inserted but not tied. The strip is then immediately placed into its bed at the edge of the lid. I have seen the inter-marginal space thus gained, nicely preserved years after.

EVISCERATION OF THE EYEBALL.

By L. WEBSTER FOX, M.D., Philadelphia.

This operation must not be confounded with abscission, although both are somewhat similar in character. The latter operation has been abandoned by the majority of ophthalmic surgeons on account of its risks.

Evisceration consists in first excising the cornea, and thoroughly removing the contents of the globe and replacing the vitreous with a glass globe.

Abscission of the cornea, as suggested by the older Critchett, was probably the best of this dangerous operation. In it, no attempt was made towards emptying the contents of the globe.

We are indebted to three English surgeons for bringing this operation prominently before the notice of the profession practically—Mules (of Manchester) first operation was performed in October 1884. Brudnell Carter, who modified the abscission operation of Critchett some years ago, is now one of evisceration's most ardent advocates; while Bickerton of Liverpool, performs this operation exclusively.

Frohlich was the first surgeon to perform the evisceration. This he carried out in 1881, and named it "Excochleation." Muldon and Graefe carried on their observations in 1884. Dubanton followed next with a series of experiments.

I shall not review the literature on the subject as it has been done by my friend, Dr. G. Oram Ring, in a very recent article on this subject.* My remarks shall be limited to my personal experience with some cases.

In 1885, I performed the operation twice in the Germantown Hospital, but the reaction was so great, including the tremendous swelling of the orbital tissue and eyelids, great pain and an elevation of temperature, (105° in one patient, 105.5° in a second), I felt that discretion was the better practice and removed both glass globes, later on removing the small stumps of the atrophied eyeballs. During the summer of 1893, while in Liverpool, Mr. Bickerton brought to my notice three patients upon whom he had recently operated. The cosmetic effect was so beautiful that I again became deeply interested, and gathered renewed courage at his success. I also had the opportunity of witnessing the operation at the Liverpool Infirmary by Mr. Bickerton, and also the after treatment. To see a skilled operator carrying out the technique of an operation, is infinitely better than to try to follow the details of a written description, be it ever so clear and concise.

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*"Evisceration of the eye-ball." reported in *University Medical Magazine*, April, 1895

The third patient* upon whom I performed this operation, June 29, 1891, at the Medico-Chirurgical Hospital, was a young Assinaboine Indian from Montana, now at the Carlisle Indian School. He was brought to the hospital by Dr. Montezuma to have the eyeball enucleated on account of pain and much discomfort. As near as we could get at the history of the loss of the eye, it was this: about three years ago, while on the plains, an inflammation of the left eye took place, which gradually progressed to an ulceration of the cornea, and finally, to complete destruction of this part of the eye. Instead of removing the eyeball, a Mules' operation was performed, under ether. The details of the operation were carried out without complication, and the patient put to bed.

The orbit was examined after twenty-four hours. No untowards symptoms were present excepting a slight swelling of the upper eyelid. Towards evening the eyeball became somewhat painful, and the patient did not rest well during the night. Temperature 102°. The next day the temperature fell to 99°. More swelling of the eyelids appeared with considerable chemosis of the conjunctiva but no discharge of pus. Chloral and bromide were given to quiet the pain, and hot fomentations were applied to the eyelids. On the third day the conjunctiva became very œdematous and protruded between the eyelids, otherwise the patient's condition was about the same as before. The internal treatment at this time was Hydrarg, Bichlor., gr. 1-31, Potass. Bromidi, gr.x., three times daily. To the protruding conjunctiva pressure bandages were applied, which restricted the protrusion.

The temperature fluctuated about the 99° line until July 7, when it fell to normal, and the various inflammatory conditions subsided. At the end of the week I removed the stitches from the conjunctiva. The sclerotic swelling did not subside for

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*Reported in *Codex Medicus*, Philadelphia, November 1894.

ten days, when the pain disappeared, and at no time during his residence at the Hospital did it return.

The operation was entirely successful, affording a beautiful support for the artificial eye which was adjusted July 18. The artificial eye stood out full and prominent with almost perfect movement, a decided improvement over the results of the old operation of enucleation.

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The details of the operation are carried out under ether. The eye is thoroughly irrigated with a lotion, which I call formula 1 to designate it from almost the same formula for sterilizing instruments. The eyelids are separated with the ophthalmostat. The conjunctiva is dissected from its corneo-scleral attachment back to about the equator of the eyeball, the muscles not being interfered with, then the cornea is excised. This is best done with a large Beer's knife, as in performing a flap operation for cataract; the lower half of the cornea is removed with curved scissors, and the contents of the globe are taken out with a small scoop, devised for the purpose. Great care is necessary to remove the ciliary bodies and choroid and the head of the optic nerve, leaving the clean, white sclera. Mr. Carter has devised a rubber bulb which is inserted into the scleral cavity and inflated with air, to produce pressure on the central artery to prevent hemorrhage. As this application has not been a success with me, I pack the scleral cavity with sterilized cotton; after waiting a few minutes this is removed and the scleral cavity is again thoroughly irrigated with a hot antiseptic fluid.

A sterilized glass globe which is best suited to the case, is then inserted with a specially devised instrument, the sclera is slit vertically so that the edges may be drawn together and held by stitches of fine catgut, completely hiding the glass ball. The orbit is again thoroughly irrigated with the hot solution, and the socket packed with sterilized cotton, over which is bound a sterilized bandage and the patient is put to bed.

*FORMULA NO I.

Irrigating Fluid.

Hydrarg-Bichlor		gr. 1-50
Zinci Sulpho-carbolatis		Grs. xxx
Aq. Menth. Pip		℥ ij
Aq. Camph		
Aq. Destil.	āā	℥ ij

M.

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When the operation is performed under strict antiseptic precautions, very little, or no, reaction follows, and the results, as Mr. Mules states, "are not as disturbing to the normal relation of the parts outside of the sclera." Dubanton and Graefe arrive at these conclusions: "That the procedure equaled in value enucleation in sympathetic disease; was safer as regards danger of purulent meningitis; can be performed in panophthalmitis, and that whenever done, a better stump is always secured." If we have in evisceration a method equally as safe as in enucleation, we certainly have in addition the advantage of giving better support to an artificial eye, getting rid of the sinister stare, the enophthalmus and more perismetric rotation with no disagreeable muco-purulent discharge so common after enucleation.

DISCUSSION.

DR. S. D. RISLEY, Philadelphia, Pa: My attention was favorably called to the Mules' operation by Mr. Carter, of London, and I have since performed it in one case with very satisfactory results. I regard the advantages of this operation to be: (1), Improved cosmetic results as compared to enucleation (He exhibited a photograph to illustrate this, in which it was not possible to detect the artificial eye). (2), The patient is much more comfortable after this procedure than after extirpation, for the reason that the tears flow off in a natural way, and he is not disturbed by the collection of muco-purulent discharge in the orbit or behind the artificial eye as is usually the case after excision. The disadvantages are: (1), The operation is a much more difficult one, and should be done only with careful attention to asepsis and antisepsis. Its satisfactory performance is greatly aided by the ingenious instrument, devised by Mr. Mules, for the artificial vitreous, and the inflated bulb, devised by Mr. Carter, for arresting the hemorrhage within the scleral cup (Instruments were exhibited by Dr. Risley). (2), A second drawback is the considerable suffering which the patient must undergo for several days in most cases. There was marked edema of lids and chemosis of conjunctiva in my case, with slow pulse and temperature of 99½ to 101° for four days. This was treated with continuous application of cold compresses and lead water and laudanum. The chemotic conjunctiva was frequently cut to allow discharge of accumulated fluid. After the fourth day edema rapidly subsided. The swelling could not be regarded as inflammatory reaction, but was probably due to cutting off the anastomotic circulation by the extirpation of the retina and choroid. (3), It is distinctly open to question, whether in cases of imminent secondary panophthalmitis, the procedure is as certain a prophylactic measure as excision, since volumes of the infectious micro-organisms might thus be outside the sclera in the lymph channels. (4), In one case in which I had proposed the Mules operation, but did an excision instead, I found the foreign body which had penetrated the ball lying near the optic nerve on the outside of the sclera to which it was still adherent. I could but congratulate myself that excision, instead of evisceration, had been performed.

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*The same formula is used for instruments, less the hydrargyrum.

Dr. G. Oram Ring, Philadelphia, Pa: While the first published case of evisceration was by Frohlich, in 1881, Mr. Henry Powers claims to have seen Hancock perform a number of such operations before that time. I have published recently the history of the case of a child of ten years upon whom I operated, and inserted a glass sphere. The reaction was very slight, and there was no swelling of the lids; temperature on the 99¼ second day after the operation, falling to normal on the third, and there remaining. The case was one of increasing anterio staphyloma in which eserine and pressure bandage had accomplished nothing. The tissues of the face surrounding the eye will, I think, develop much more satisfactorily, when such an operation is performed on a young child than after enucleation. The cosmetic effect is unquestionable. Referring to Dr. Hotz's case of sympathetic neuritis following evisceration and to the two published cases of sympathetic ophthalmia, of Dr. Cross, following the performance of the Mules' operation, I believe, with Mr. Carter, that as there had not been primary union of the scleral edges, the irritation was not chargable to the insertion of the artificial vitreous. Should there happen to be extensive infiltration into the deep tissues of the orbit, compelling deep incision, evisceration with or without glass globes would, as claimed by Dr. Noyes, distinctly hinder the satisfactory progress of the case. The perimetric measurements of his case were very gratifying. Inward rotation 20°, outward nearly 40°.

Dr. F. C. Hotz, Chicago, Ill: One of the gentlemen has referred to my paper on Sympathetic Ophthalmia following Evisceration, in which paper I spoke of the better cosmetic results claimed for evisceration and showed by measurements that, as far as rotation was concerned, it was not in favor of evisceration. I have continued these measurements since, and regret to say that I have had no opportunity to measure the artificial eye set upon an artificial vitreous. I am not yet satisfied that the results of rotation are any better in this method. As to the cosmetic effects—after examining these photographs, I do not see that the sinking condition of the upper lid is much better than after enucleation. The only point in favor of an artificial vitreous after evisceration, is the fact that the socket is full, and consequently, there is no irritation from tears so troublesome after enucleation.

Dr. E. Oliver Belt, Washington, D. C.: I want to ask if anybody here has had any experience in inserting the glass globe into the capsule of Tenon after operation? It seems to me that you would get rid of the disturbing secretion and have the advantage of a full orbit. Perhaps the only thing that would not be as good as after evisceration would be the movements of the eyeball.

Dr. H. Gifford, Omaha, Neb: In regard to the movements of an artificial eye after evisceration, I have made some investigations, and, while I confess I have been disappointed in some cases, I have found decidedly superior rotation, and this increasing directly with the size of the stump, upon which the artificial eye was set. When placed upon an atrophic ball, I found it so much better that there was no comparison whatever, and, hence, cannot coincide with Dr. Hotz on that point. Now, there is one other point, about the danger of sympathetic ophthalmia after evisceration that was mentioned by Dr. Risley. You possibly leave germs in the lymph channels about the eyeball. I doubt very much whether a few germs in this locality would make the difference you might suppose, upon superficial examination. One germ does not make a sympathetic ophthalmia. I think the toxines play a more important part in the development of the trouble. A point which may account for sympathetic trouble following evisceration is, that no matter how carefully you do it, you may leave some pigmentary cells or fragments of the retina attached to the optic nerve. I have experimented upon a considerable number of rabbits, and upon examining them, been surprised to find quite a long piece of retina remaining attached.

Dr. L. J. Lautenbach, Philadelphia, Pa.: Considering only the mechanical appliances used, the glass balls are compressed spheroids with a surface more or less flattened, and on this there is a small depression. It is evident that if it is desired to preserve the most perfect muscular motion, that the greatest circumference must correspond to the equator of the eyeball, and the flattened surface must be anterior, on account of the inner surface fitting accurately at the nerve entrance of the eviscerated ball. Now the instrument here shown, does not accurately so place the ball. If it does not, the ball may yet adapt itself in the proper position, or be placed there by the operator. This suggests an instrument constructed to hold the ball by vacuum method until it is inserted. It consists of a rubber ball attached to a tube, which opens out with a sort of lip of soft rubber, of a size sufficiently large to adapt itself to about one-third the area of the glass sphere. To serve as a handle or support, the lip is made rigid by a backing of brass which extends over the rubber tube as well. By extracting the air in the bulb, and placing the glass ball in proper position in the cup, the ball, being firmly held, is easily placed in position with its flat side forward. If necessary, an expanding speculum could readily be devised to hold the sclera open, while the ball is being placed in position. Another point which suggests itself to me is the thinness of the glass of which these balls are made. This piece which I hold in my hand is about 1-80 of an inch in thickness. It is evident that in putting in an artificial vitreous we can at least use a weight of material equal to that of a normal vitreous and could therefore use glass of 1-40, or even 1-10 of an inch in thickness. The danger of breaking by blows would be lessened as well as that arising from the attrition of the two glass surfaces even though the stitched sclera lies between them.

Dr. R. C. Hodges, Houston, Texas: It strikes me that from my understanding of the technique of Mules' operation that Dr. Lautenbach has his diagram reversed.

DR. L. WEBSTER FOX, Philadelphia: I think Dr. Lautenbach does not quite comprehend the operation from his remarks upon the instrument. The ball is covered by the sclerotic just as a base ball is enclosed within leather. The cases I have examined show it to be one hard body with the sclerotic surrounding it, and the conjunctiva in front. As to the breaking of these balls, the Indian boy of whom I spoke, received a hard blow, and the eye was broken, but not the glass ball. No ordinary blow would break one, I am sure.

THE OLBIQUE MUSCLES AS RELATED TO OBLIQUE ASTIGMATISM: REPLY TO DR. HOTZ'S CRITICISM.

By G. C. SAVAGE, M.D., Nashville, Tenn.

EDITOR ANNALS:

With your kind permission, I will occupy a part of your space in answering the criticism of my views on the action of the oblique muscles in oblique astigmatism, as published by Dr. F. C. Hotz, in your last issue. Allow me first to plead guilty to the charge of having "talked" much, and "written" more on this subject. I plead guilty, further, to the charge of having taught one thing (harmonious non symmetric action) in 1887, and another thing (harmonious symmetric action) in 1891. To have taught an error is to no man's credit. It was my good fortune, however, to detect this error. I quickly exposed the incorrectness of my 1887 teaching—just as quickly as if another had been the unfortunate one. The main thought of my first paper was, that oblique astigmatism was more annoying than the vertical or horizontal, because in the former the oblique muscles were involved. This was no error. I then knew nothing of the obliquity of images in oblique astigmatism; and believing the old teaching that the oblique muscles must always keep the naturally vertical meridians parallel, I readily fell into the error of teaching that the action of the obliques, caused by oblique astigmatism, was "harmonious non symmetric." I at that time conceived the purpose of the rotation to be to bring the meridian of best curvature to, or as far as possible toward, the vertical or horizontal position, a work in which the obliques were often aided by a leaning of the head toward the shoulder. I then thought that vertical (and horizontal) astigmatism gave least trouble, because of the mere fact of position; but now I can understand why oblique astigmatism, with meridians of greatest curvature parallel, will give as little trouble, for in each of these conditions, any object will throw similar images on corresponding retinal parts. For the reason that the obliques do not have to perform their complicated function in these forms of astigmatism, their correction is never attended by metamorphopsia or other annoyance.

I try always to "have a reason for the faith that is within me;" and any change of faith or teaching, on my part, must be based on reason. My reason for abandoning the teaching of harmonious non-symmetric action of the obliques in oblique astigmatism, and, in its place, teaching that these muscles must act symmetrically, is that the refraction of such eyes cause the formation of dissimilar images on non corresponding parts of the retinæ. This thought of oblique images in oblique astigmatism occurred to me one night early in 1891, and the next day I was able to demonstrate its correctness, not only to my own satisfaction, but also to the complete satisfaction of Dr. G. H. Price. I did not then remember that Dr. J. A. Lippincot had taught us this in the *Archives of Ophthalmology*, March, 1889.

Dr. Hotz complains that I have not given my "method of observation." and that I failed to set forth "the tests or experiments" that led me to my conclusions, so that others might judge for themselves as to the correctness of same. This accusation was certainly inadvertent, for a little further on (page 105 of your last issue) he quotes my experiment in part. I give it here in full:

"The obliquity of the image in oblique astigmatism is a matter demonstrable. One can artificially produce any kind of astigmatism. One who is emmetropic, or at least is non-astigmatic, by placing a—3 D cyl. before each eye in trial frames, creates 3 dioptres of hypermetropic astigmatism. The axis of the left cylinder being at 90° and that of the right at 135°, he has made of his own eyes the kind represented by figure 2. He may now for a moment place the opaque disc in front of his right eye, at the same time placing the double prism (each 6°) before the left eye. A horizontal arrow, head to left, having been drawn on a card board, he looks through the double prism and sees two horizontal, hence parallel, arrows. On removing the opaque disc from the right side of the trial frame, a third arrow appears between the other two but not parallel with them—it is oblique down and to the patient's left. On removing the double prism, two arrows are at once readily seen, the one crossing the other, as in figure 8. In a moment the two arrows begin to shut and open like the blades of a pair of scissors, and finally they are merged indefinitely into one."

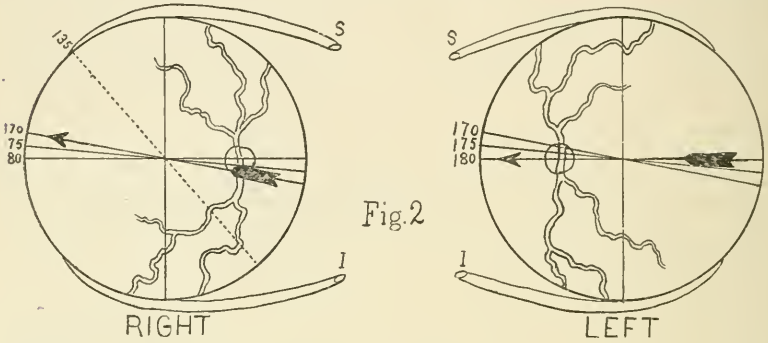

Fig.2

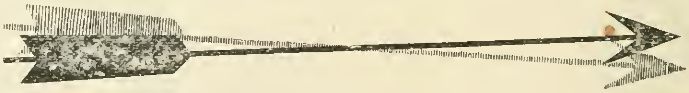

Fig. 8.

I commenced the experiment convinced that artificial astigmatism would produce the same image changes which result from natural astigmatism, and what convinced me was that my 3 D artificial hyperopic astigmatism was thoroughly corrected by a + 3 D cyl., axis coinciding with the meridian of unaltered curvature. The above experiment seems to me to be convincing. I have other reasons for believing in the obliquity of images, and will give some of them in words I recently used in *The Journal*.

"Let Dr. Hotz take any case of astigmatism of more than 3 D. with the meridian of greatest curvature either vertical, horizontal or oblique, and, if the patient has ordinary intelligence, he can soon satisfy himself that astigmatism is not only capable of blurring, but also of distorting an object. One eye should be excluded, while the patient is asked to look at a rectangular card two by four inches, held vertically, immediately in front of the patient at the reading distance. As the card is revolved on a pin piercing its center, the patient should be asked its shape when at three definite points. When the long sides of the card are parallel with the meridian of greatest curvature, the patient will say it is a rectangle; when these sides form an angle of 45° with the meridian of greatest curvature, the answer will come quickly that it is a parallelogram; again, when these sides are brought to right angles with the meridian of greatest curvature, the card again is seen as a rectangle. But, possibly, Dr. Hotz is ready to say that these statements, as to the distortion of the object, prove nothing as to the distortion of the retinal image. Let us see: The law of projection (direction) is supreme in monocular vision, therefore the lower border of the retinal image must be in the same plane with the upper border of the card, and so on for all the borders of card and image, and these planes must all cut the nodal point. Then in obedience to this law, the image must be distorted when the object appears to be.

"Only one other argument as to the distortion of the retinal image in an astigmatic eye, when the object is held so that its outlines are oblique to the principal meridians: all will agree that the meridian of least curvature is the line of union of the bases of the prismatic arrangement of the astigmatic cornea, and that all prisms refract light toward the base. Let us then take the right eye of a case of astigmatism with the meridian of least curvature at 135°: a horizontal line held before this eye will send its light from its entire length into the eye; but, for convenience of study, we will consider only the axial rays coming from the two extremities. The ray from the left end of the line strikes above the meridian of least curvature, and must be bent towards it, its subsequent course in the eye necessarily being down and out; the axial ray from the right end of the line strikes below the meridian of least curvature and must be bent towards it, the course of this ray after refraction being up and in. Thus it is easily shown that the image of this horizontal line must be inclined down and to the right. Because of this inclination of the image, the line itself seems inclined to the same extent, and in the same direction. This is one law of physiologic optics.

"The distortion of retinal images in monocular vision is settled by the law of direction; the rotation of the eyes by the oblique muscle, in oblique astigmatism, is compelled by the more powerful law of corresponding retinal points."

Dr. Hotz made the following quotation from one of my papers: "In oblique astigmatism, be the obliquity much or little, it is a physical impossibility for the horizontal object and its retinal image to occupy the same plane. The same is true of all objects not in a plane with one or the other of the two principal meridians." Forgetting that the closing sentence of the above quotation had been made, the Doctor informs me and your other readers that "the objects in nature are not all horizontal arrows, but present also vertical and oblique outlines," "unfortunately for Dr. Savage's theory."

The fact that when oblique astigmatic eyes attempt to fuse images of a horizontal line, the images of a vertical line harmonize less, which Dr. Hotz thinks unfortunate for my theory, is favorable to my teaching. In an editorial in the OPHTHALMIC RECORD, referring to Dr. Wilson's criticism as published in the *Archives of Ophthalmology*, I conceded that the same eyes could fuse images of either horizontal or vertical lines when they existed alone; for example, the meridians of greatest curvature diverging above, the superior obliques would cause the fusion of the images of a horizontal line, and the inferior obliques would fuse the images of a vertical line. In the same editorial I taught that when both horizontal and vertical lines are viewed, the eyes attempt the fusion of the horizontal lines only: but was unable then, and am unable now, to give any reason for this. I only know it to be a fact. My knowledge of the fact rests on these observations which may be repeated by any one: In a case of 3 D astigmatism with meridian of greatest curvature at 135° for right eye, and 45° for left eye, if a rectangle be looked at by the right eye alone, it will be seen as a parallelogram leaning down and to the left; by the left eye alone, a parallelogram leaning down and to the right; with the two eyes together, it will be seen as a trapezoid with the longer side above. By action of the superior obliques, the upper borders of images (lower border of object) are completely fused, while at the same moment, all of the lower border of right image, except its inner extremity, is fused with a corresponding portion of the same border of the left image. The parts of the lower borders of the two images not fused are directly continuous with the fused portion, hence the greater length of the upper border of the object. Of the two diverging borders, the right one is seen by the right eye, and the left one by the left eye.

If the meridians of greatest curvature had converged above, the action of the inferior obliques, in binocular vision, would have converted the rectangle into a trapezoid with the longer side below. As already stated, this preference for fusing horizontal lines, is distinctly shown in the higher degrees (3 D or more) of natural oblique astigmatism. It is also distinctly shown in similar degrees of artificial astigmatism. The chief purpose of the existence of the recti and the *oblique* muscles is the fusion of images in binocular vision.

As to Dr. Hotz's experiment with his + 10. ⌒ + 2. cyl., I have this to say: His slit in the metal screen was entirely too short (1 inch) to be so far removed (several feet) from the surface representing the cornea. Necessarily this slit, at such a distance, would throw a very small image on the ground glass four inches behind the lens, and thus make it very difficult to detect the slight leaning (less than 2°) of the borders, caused by the weak cylinder used. A slit several inches long and only a few feet away from the lens, would have thrown a much longer image on the ground glass, so that the very slight change in the direction of the image borders could have been easily detected. Dr. Hotz's report of this experiment is as strange as fiction, though given as a fact: When the slit occupied the horizontal position, the cylinder, when revolved, inclined the vertical lines without altering the direction of the horizontal lines; when the slit was turned to the vertical position, the same cylinder, when revolved, inclined the horizontal lines without changing the direction of the vertical lines. A lifeless lens cannot show any partiality to rays of light coming from horizontal or vertical lines that bear the same relationship to the cylinder axis.

Finally, allow me to try to break in pieces the key-stone of his argumental arch, viz., the clinical test to which he put my theory. The case reported was one of mixed astigmatism, and the cylinder given the right eye probably was a—3 D, and that for left eye a—2 D. The meridian of greatest curvature in O. D. was at 115°; in O. S., at 65°. (These meridians diverged above. The image of a rectangle would have been distorted down and in by each eye, and in binocular vision these leaning parallelogram images would have been fused so that the patient would have seen a trapezoid long side above.) The correcting cylinders were given, and metamorphopsia was observed at once by the patient; but he does not give the character of the changed vision. Without the correcting lenses on, he resorted to a test—the double prism—which he states I had advised, and he found all three lines parallel.

My first strike at this "key-stone" will be with the statement that I have never resorted to this test by the double prisms in uncorrected natural oblique astigmatism, nor have I ever advised it. I would expect the lines to be parallel, for the obliques, from habit, would so rotate the two eyes as to make the lines parallel. If he had used the double prism test on his patient, while wearing her spectacles and still troubled with the metamorphopsia, he would have found want of parallelism of the middle line with the two other lines—it would have inclined down and toward the corresponding side. The same test applied after the disappearance of the metamorphopsia, the spectacles being on, would show parallelism of the lines; but removing the lenses at this time, the test would show the middle line leaning down and toward the opposite side. The explanation of all this is easy:

The double prism test in oblique artificial astigmatism (this I did advise) will always show the dipping of the middle line, because the habit of rotation by the obliques has not been established. In Dr. Hotz's case of mixed oblique astigmatism, the superior obliques had been always in the habit of rotating the eyes, and this habit re-asserted itself when the eyes were under the double prism test, as may always be expected, and the lines were parallel. If the metamorphopsia has disappeared under the wearing of the lenses, the double prism test applied to the naked eyes will show the middle line dipping down and toward the opposite side, for the habit of rotation has been broken. There never was (there never will be) a time in this case when, with the naked eyes, there was not metamorphopsia of that kind which would have made a rectangle appear as a trapezoid, the longer side above. To this form of metamorphopsia the patient had always been accustomed, and therefore was not worried about it. The form of metamorphopsia with the lenses, when they were first given, was a new kind

—the trapezoid had its long side below, necessarily, though the Doctor did not tell us so much. Being new to the patient, it was naturally annoying. An explanation of this new metamorphopsia is easy: while carrying the patient through the examination for the lenses, he, of course, excluded one eye. The uncovered eye naturally rolled into the position of rest of all the ocular muscles, and the axis of the cylinder for that eye was located. Similarly the cylinder was given the other eye. In binocular vision the old habit of rotation by the superior obliques was re-asserted, and there was a consequent loss of coincidence of the axes of the cylinders and the meridians of least curvature (the cylinders were concave), the cylinder axes being thrown about 3° in the arcs of distortion for the inferior obliques. In this case the metamorphopsia could disappear only by the superior obliques giving up work which the inferiors must take on. Without the lenses, the superior obliques have been forced to converge the naturally vertical meridians; with the lenses on, the inferior obliques must parallel these meridians. Usually this change is quickly accomplished in cases like this one. Dr. Hotz will not deny that the cylinders given changed the direction of the images of vertical and horizontal lines. To my mind it is clear that the leaning of images, caused by the lenses, was equal in extent, but opposite in direction, to that produced by the astigmatic cornea. The lenses have only rectangled the images of the rectangular figure. If in these cases the oblique muscles would only allow the cylinder axes and the meridians of best curvature to remain co-incident in binocular vision, there would be no such thing as metamorphopsia ever complained of. It is never observed by patients having astigmatism equal in the two eyes and the best meridians parallel, though they may be oblique. When the meridians of greatest curvature converge above, the use of correcting cylinders is always attended by metamorphopsia, which is slower to disappear than in cases like Dr. Hotz's.

Dr. Hotz's closing paragraph, if true, would wipe out all that I have ever written about oblique astigmatism and the oblique muscles. This is his language: "It is therefore evident that neither experiments nor clinical observations nor the laws of physiological optics, sustain the doctrine of the obliquity of the retinal images, and the necessity of any action of the oblique muscles in oblique astigmatism."

In another part of this reply, I have shown conclusively that both experiment and clinical observation showed my teaching to be correct; so that two of his three witnesses against my views have been made to testify in favor of them. It is even easier to capture his third witness (physiologic optics), and thus make the trio give evidence the very opposite to that which he intended they should give. Without doing violence to the laws of physiologic optics, I may state that every point of an astigmatic cornea has two radii of curvature, one the radius of spherical curvature, the other the radius of cylindrical curvature. * In the horizontal meridian of a vertical astigmatism these two sets of radii are in the same plane, hence the rays of light entering this eye in the horizontal meridian, would be in the same plane after refraction as before. Above or below the horizontal meridian, and out or in from the vertical meridian, there is not a corneal point that would give us these two radii in the same plane; the radius of spherical curvature would go to the center of the sphere, while the radius of cylindrical curvature would necessarily be in a horizontal plane. Both of these radii will be directed to the plane of the vertical meridian, but they diverge as they go. A ray of light striking such a point, must undergo a double refraction (a resultant refraction). If the corneal point is thus related to the horizontal and vertical meridians, the ray of light passing through it must be deflected towards each of the two radii; therefore, the refracted ray can no longer occupy any plane in common with the incident ray.

Allowing the retina to remain in its normal position, let us revolve the astigmatic cornea discussed above, so that the astigmatism shall be oblique at an angle of 45°. In doing this, we have not altered the relationship of the two sets of radii—those that were in the same plane before, are so now; those that diverged before, diverge still. Let us conceive it to be the right cornea and that the meridian of least curvature now stands at 45°. The meridian that was at 45° when the astigmatism was vertical, stands at 180° when the astigmatism is oblique at 45°.

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* There is but one radius, the resultant of the other two. This radius is not that of a spherical or a cylindrical surface, but of a sphero-toric surface.

What happens now to the axial rays in the horizontal plane? We will take three of these rays and follow them as they make their way back to the retina: one ray is from the middle of a horizontal line (arrows, if you please), one is from one end of the line, and the other is from the other end. These rays must converge toward that part of the cornea in front of the pupillary space. They come to the eye in the same plane and strike the horizontal meridian of the cornea. The point of fixation is the center of the line; therefore the middle of these three rays strikes the center of the cornea vertically, and co-incides with both the radius of spherical and the radius of cylindrical curvature for that point, hence passes through the cornea without being refracted at all, and impinges on the retina's horizontal meridian. The ray from the right end of the line strikes the right side of the cornea at a point in the horizontal meridian, the two radii of which diverge, the radius of spherical curvature being in the horizontal plane, the radius of the cylindrical curvature pointing down, as well as towards the plane of the meridian of least curvature. It is clear that this ray must undergo a double (resultant) refraction. Striking the cornea to the temporal side of radius of spherical curvature, it is so refracted as to converge less toward the middle axial ray (in this it is aided by the cylindrical curvature), and being incident to the radius of the cylindric curvature on its lower side, it must be refracted down also. Following its subsequent course, we find it impinging on the retina below the horizontal meridian, to the nasal side of the vertical meridian. The ray from the left end of the line, coming to the cornea in a plane with the other two, strikes the cornea on the nasal side of its center and in the horizontal meridian, at a point where the two radii diverge, the radius of spherical curvature being in the horizontal plane, the radius of cylindrical curvature pointing up and toward the plane of the meridian of least curvature. Striking the cornea on the nasal side of the radius of the sphere, this ray is made to converge less toward the middle ray than before refraction; striking the cornea on the upper side of the radius of cylindrical curvature, it is also refracted upwards. Following this ray to the retina, we find it impinging above the horizontal, and on the temporal side of the vertical, meridian. A line drawn through these three points of impingement will locate the image of the line (arrow) looked at. It is inclined in obedience to the plane law of refraction that a ray of light in passing from a rarer into a denser meridian, must be refracted toward the perpendicular at the point of impingement.

There is one other objection which Dr. Hotz brought forward, viz:, While a concave cylinder held obliquely in front of an eye at some distance, will make horizontal and vertical lines appear inclined toward its axis, this inclination grows less and less as the eye is approached, and, as he thinks, disappears entirely when the cylinder is brought into contact with the cornea.

This is all easily explained. Take again the three axial rays in a horizontal plane. Striking the horizontal portion of the oblique cylinder, the middle ray passes through unrefracted and continues in the same plane, while one of the outer rays is made to deviate downwards, and the other, upwards. For convenience of study, we will say that the deviation of each ray is 2° from the horizontal plane. This deviation continues the same until the retina is reached, regardless of whether this distance is one metre or 25 mm. In obedience to the law of direction, the horizontal line is made to appear to incline more when the cylinder is held one metre from the eye than when it is held 50 cm. away. In obedience to the same law, the line appears less and leſs inclined as the oblique cylinder is made to approach still nearer the eye, but even when brought into contact with the spherical cornea, its inclination does not and cannot disappear entirely, though often one may not be able to perceive that there is still an inclination. This apparant change in the direction of a line, viewed through a concave cylinder held obliquely as it is moved from arm's length to the eye, could not be explained if Helmholtz's law of direction were true. If the axial ray were the line of direction, the apparent obliquity of a horizontal line would be the same, whether the cylinder causing the phenomenon were held at arm's length or in contact with the eye, for the reason that, after the axial rays are deflected, some above and some below the horizontal plane, they pursue a straight course (except for spherical refraction) to the retina whether it be far away or near by. These rays prolonged, according to Helmholtz, would locate the source of the light, and necessarily would give it the same apparent inclination for all distances at which the cylindrical surface might be held from the eye. Not so with that law of direction which says that all lines of direction are radii of retinal curvature prolonged. This law makes it necessary for the line to appear to incline more when the cylinder is held far away from, and less when it is brought close to, the eye.—*Annals of Ophthalmology and Otology.*

DR. WILSON'S CAMERA

Was recently called in to give testimony against the obliquity of retinal images in oblique astigmatism.* His six photographs show the very opposite to that which he intended, as any trained eye can tell at a glance. The pictures were shown this morning to three civil engineers, two architects, three oculists (not including the writer), one photographer, six other men and two ladies, every one of whom said that the church spire in No. 2 leaned to the right, in No. 3 to the left, in No. 5 to the left, and in No. 6 to the right. By actual measurement the leaning was found to be 1° 07½′, making some allowance for error that might result from dimness of image. It is wonderful that Dr. Wilson did not detect this leaning, especially when contrasting Nos. 5 and 6. If it is easy for a man to see what he is looking for, it must be very hard for him to see what he does not want to find. In speaking of the pictures, Dr. Wilson says that Nos. 5 and 6 correspond, except in sharpness of outline, with Nos. 2 and 3, whereas 5 and 3 correspond, and 6 and 2, as can readily be detected.

If Dr. Wilson cannot convince himself that the image of the church spire is made to incline as a result of the action of a cylinder obliquely placed, we would suggest that he have a few civil engineers and architects examine the photographs and pass judgement on same.

Our reply to Dr. Hotz in this issue, and Dr. Wilson's photographs, ought to be convincing evidence in favor of obliquity of the retinal images in oblique astigmatism.

We expect the truth to come from the pulpit of a church; Dr. Wilson's camera has made the spire speak the truth with no uncertain sound. G. C. S.

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*See Journal of Ophthalmology, Otology and Laryngology, Vol. vii., part 3, (July, 1895, issue).

THE

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THE RETINAL IMAGES IN OBLIQUE ASTIGMATISM.

By J. B. LOWRY, M D., Nashville, Tenn.

Until recently, optical laws have not fully been brought to bear upon oblique astigmatism, which is a most important error, both to patient and physician, if Dr. Savage's teaching is true. Let us apply some tests to see if we can determine whether or not he is correct in his conclusions.

It has often been noted that the camera obscura is very strikingly similar in its mechanism to the human eye. In this simple optical instrument, we have a mechanical eye so far as refraction is concerned. If we compare to the eye, the component parts of the photographic camera, which is merely a camera obscura with a device for receiving the image on a sensitized plate, we find the refractive media of the former correspond to the photographic lens; the iris, to the stop; the accommodation, to the focusing apparatus; and the retina, to the ground glass. Focus the camera properly, and we have the emmetropic eye. By placing a concave cylindrical lens, axis at 90°, in apposition to the photographic lens, we have simple hypermetropic astigmatism according to the rule. If we place the axis at 180°, we have simple hypermetropic astigmatism against the rule. If we place the axis anywhere between the vertical and

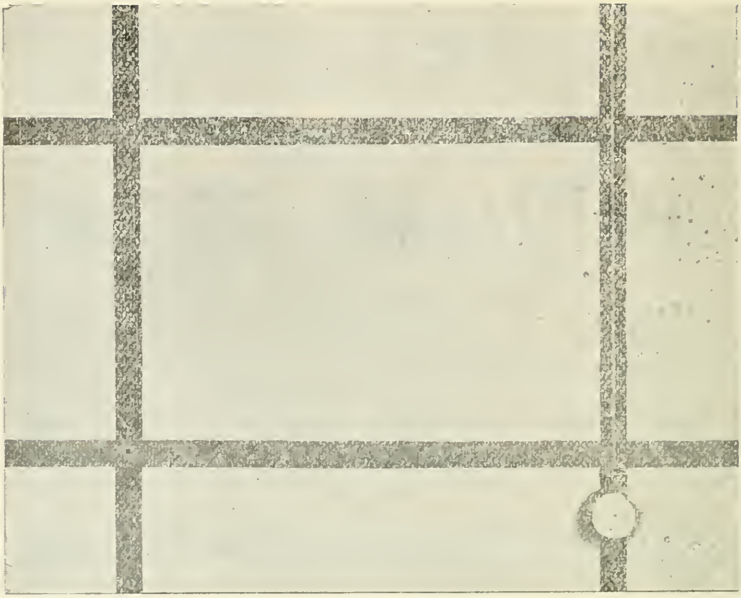


Fig. 1.

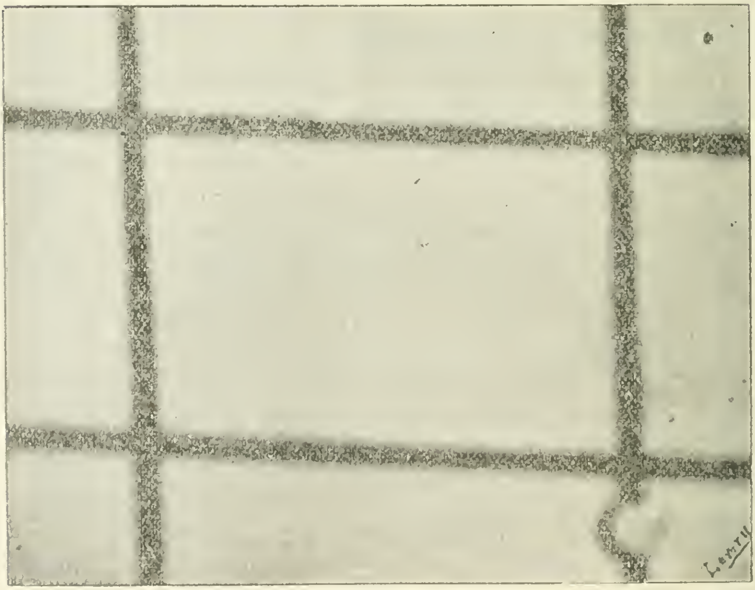


Fig. 2.

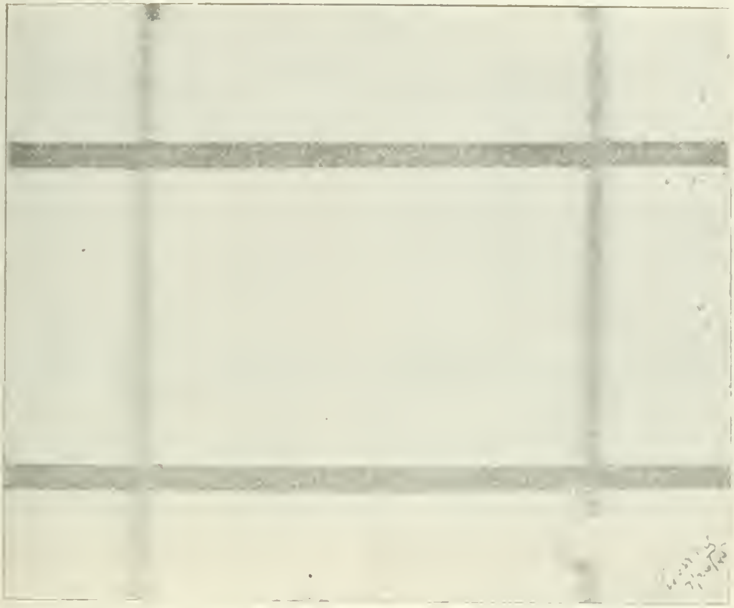


Fig. 3.

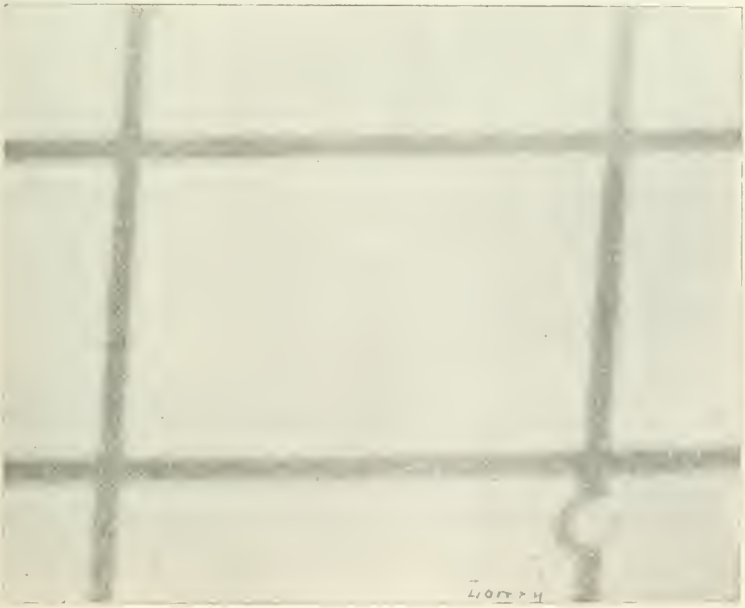


Fig. 4.

horizontal, we get oblique astigmatism. Whether or not the image will be oblique on the ground glass, will be seen later.

To illustrate these points, I have made the accompanying photographs with a rapid rectilinear lens, used in the Rochester Optical Company's 5x7 midget camera. The camera was not moved or changed in any way for the first five photographs. Fig. 6 was made at another time. The rectangle was made mathematically accurate on a piece of card-board 24x30. The lines one inch wide are prolonged beyond the rectangle to show more clearly the obliquity that may be produced by the cylinders, obliquely placed. The watch is used as a plumb, and is seen in the same position in all. The photographs are not inverted as the images would be on the ground glass or the retina.

In Fig. 1, no cylindrical lens is used, and we get a perfect rectangle, sharp and distinct in its outline, as would be seen by an emmetropic eye.

In making Fig. 2, a —3 D. cylindrical lens is placed just in front of, and in apposition to, the photographic lens, with its axis at 45°. A +1.50 D. spherical lens is used with the cylinder in order to give the middle of the focal interval without changing the camera. In this, the vertical and horizontal lines are equally indistinct. The vertical lines deviate to the left at the top, and to the right at the bottom; while the horizontal lines are depressed at the right, and elevated at the left. The plumb shows that the card is in just the same position as in Fig. 1, and the camera has not been moved from its original position. This picture is clearly a non-rectangular parallelogram.

If the axis of the cylinder be changed to 90°, we get Fig. 3, which represents simple vertical hypermetropic astigmatism. This is made without the +1.50 D. sphere and without the camera changed in the least from its position in Figs. 1 and 2. The meridian of greatest curvature here is at 90°, with the least at 180°. It is a perfect rectangle with its horizontal lines sharply cut and the vertical very indistinct.

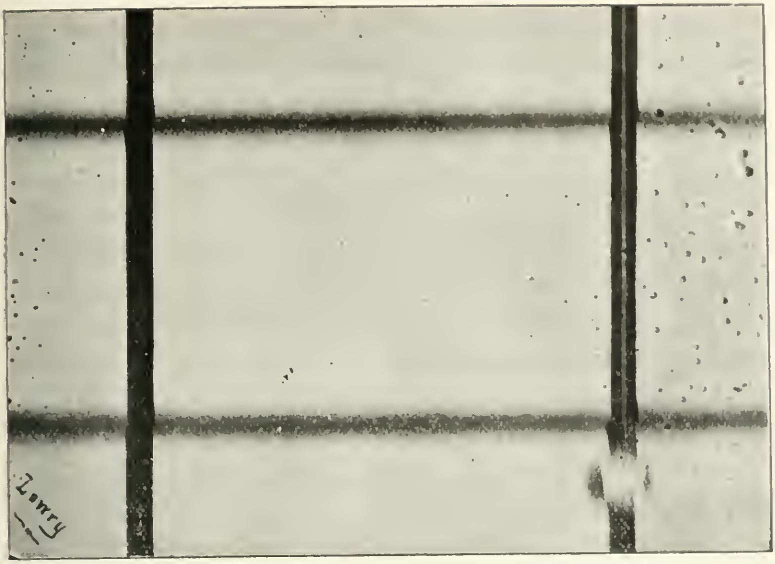


Fig. 5.

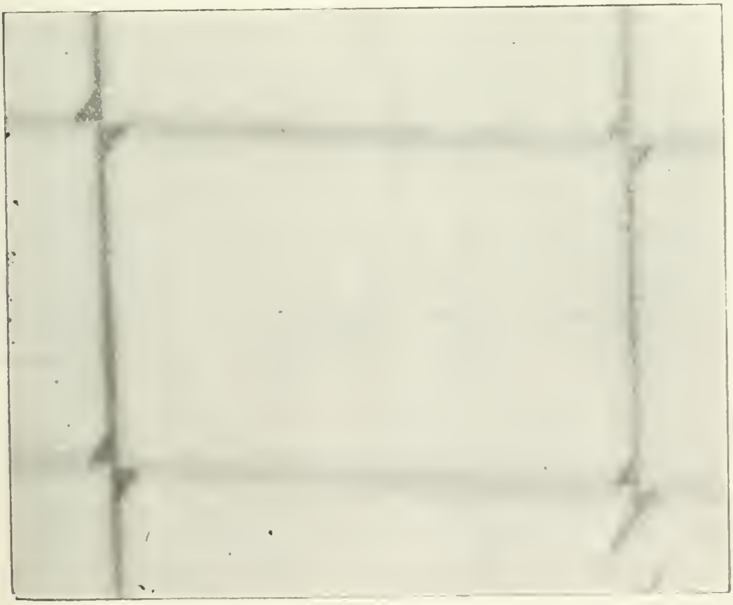


Fig. 6.

Now, if we place the axis of the cylinder at 135°, again adding the +1.50 D. sphere, a non-rectangular parallelogram is formed with its sides deviating in the opposite direction to those in Fig. 2. This is shown in Fig. 4. Every part is equally indistinct, and nowhere are the lines at right angles as in the original.

By placing the axis of the cylinder at 180°, without the +1.50 D. sphere, we produce simple hypermetropic horizontal astigmatism, the effect of which is illustrated in Fig. 5. Here we have the meridian of greatest curvature at 180°, and the least at 90°. We obtain a perfect rectangle with its vertical lines clear and its horizontal very indistinct, in contra distinction to Fig. 3.

Fig. 6 is the same as Fig. 2 without the +1.50 D. sphere to give the focal interval, nor is the camera re-focused to give it. This photograph was made at a different time, and the camera was not in exactly the same position as for the other five. An eye with the meridian of greatest curvature at 45° and 3 D. of hypermetropic astigmatism would see the object as shown in this figure, if under the influence of a mydriatic, or in old age, it was relieved of all ciliary action. The rhomboidal figures are seen very clearly here at the angles and on the watch.

It is very evident that if we had 3 D. of hypermetropic astigmatism in each eye with their meridians of greatest curvature parallel at 45°, each eye would see the object as seen in Fig. 2; for the rays of light from each point of the object would strike corresponding points of each retina and the two images would be superimposed, giving, in binocular vision, but one image, distorted as shown in Fig. 2. The person, always being accustomed to seeing vertical and horizontal objects deviating from their normal position, would suffer no inconvenience from the error other than ciliary strain brought about by an attempt to place the image at the middle of the focal interval in order to get the most distinct image of all its parts.

Many of the headaches and so-called neuralgias that are complained of by school-children, young and middle aged people who use their eyes for close work, such as reading, sewing, etc., are due to this strain, and can be corrected by placing before their eyes the proper cylinders with their axes at the proper angle, which will at the same time correct the obliquity of the image. As mentioned previously, in old age, when there is paralysis of accommodation, or under the influence of mydriatics, this strain is relieved but the image is not made more distinct. That oblique astigmatics do really see objects distorted, is proved by the fact that some of the noted painters, suffering from uncorrected astigmatism, in placing on canvas what should be vertical, so far deviated from that direction as to mar their otherwise fine paintings.

The same ciliary strain is noticed in vertical and horizontal astigmatics and for the same reason. It should be stated, however, that there is no ciliary strain in myopic astigmatism for distance, as any effort on the part of this muscle would tend to make vision worse instead of better, and any strain is an attempt in some way at an improvement of the image of an object.

Suppose one of the meridians of greatest curvature be at 45°, and the other at 135°. According to the law of corresponding retinal points, one image would be seen as in Fig. 2, and the other as in Fig. 4. As a result, we would have these two figures superimposed, forming a trapezoid. If the meridians diverged above, we would have the long side above, and the short side below. In this form of astigmatism, we would not only have a ciliary strain, but the superior obliques would make an attempt to bring the harmonizing parts of the two retinæ under the dissimilar images in order to have a single image. If the meridians converged above, the short side of the trapezoid would be above and the long side below. This fusion of dissimilar parallelograms into a trapezoid, long side above, would be effected by the inferior obliques. Dr. Savage has shown this very clearly in his paper, read at the Edinburgh Congress.

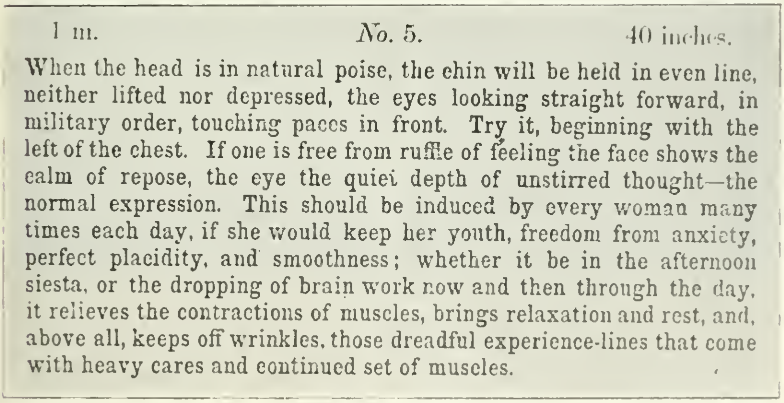
But the bone of contention has been, principally, the question of the deviation or the non-deviation of the image on the retina in oblique astigmatism. Others have proved it by the laws of optics, by clinical experience and by logical reasoning; and it seems to me, that my photographic demonstrations have added very conclusive evidence to Dr. Savage's theory, that in oblique astigmatism, the retinal images of vertical and horizontal objects deviate from their normal direction.

ASTIGMATISM.—ACCORDING TO, AND CONTRARY TO THE RULE.

By C. H. PERRY, M. D., Oneida, N. Y.

Read before the Madison County (N. Y.) Medical Society, Dec. 11, 1891.

That astigmatism contrary to the rule, produces more ill results, both immediate and remote, and is much more difficult to correct than astigmatism according to the rule, is well known; but so far as the writer is aware, the mechanism of these conditions has not been worked out.



1 m. *No. 5.* 40 inches.

When the head is in natural poise, the chin will be held in even line, neither lifted nor depressed, the eyes looking straight forward, in military order, touching paces in front. Try it, beginning with the left of the chest. If one is free from ruffle of feeling the face shows the calm of repose, the eye the quiet depth of unstirred thought—the normal expression. This should be induced by every woman many times each day, if she would keep her youth, freedom from anxiety, perfect placidity, and smoothness; whether it be in the afternoon siesta, or the dropping of brain work now and then through the day, it relieves the contractions of muscles, brings relaxation and rest, and, above all, keeps off wrinkles, those dreadful experience-lines that come with heavy cares and continued set of muscles.

Fig. 1.—Emmetropia.

The object of this paper is to make a few suggestions which may aid some more able experimenter in the elucidation of this problem.

When a convex cylindrical lens of 2 D. is placed before an emmetropic eye, with its axis horizontal, the eye is rendered astigmatic according to the rule, and the vertical lines on the clock face test card, or in print, are black and clear, while all lines that are not perpendicular are blurred (Fig. 3). By closing the eyelids so as to leave only a narrow space between them, all the lines become black, distinct and clear. That this correction is not due to a change in the curve of the cornea, or to any change in the crystalline lens is proved by holding a narrow slot horizontally before the wide open eye and thereby producing the same result. (Compare Figs. 1 and 7.) The fact, also, is noted that no person during an ophthalmometric examination has been able, by any movement of the eyelids, or by any muscular contraction in, or about the eye, to change the curve of the cornea as much as a quarter of a dioptre.

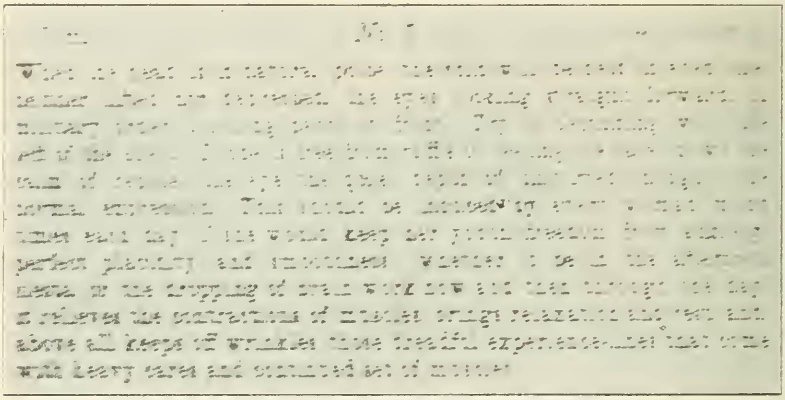


Fig. 2.—Myopic astigmatism against the rule.

The conclusion is, therefore, that the correction was made by using a horizontal strip of the lens, so narrow that there is practically no difference in its curves, hence no astigmatism.

Again the same lens is held before the eye with its axis vertical, producing an astigmatism contrary to the rule. The horizontal lines are clear and distinct and the others are in a fog. The slot is again placed before the eye horizontally, but there is no correction. The lines are the same as without it, the horizontal clear and the others misty. The eyelids are closed as before, but no correction results. A strip of lens has been isolated, but it is not the right one: the slot is held vertically before the eye and everything becomes clear, but this cannot be done with the eye-lids, and if the correction is made it must be done with the ciliary muscle, and it is just this unequal contraction of the fibres of the ciliary muscle that produces eye strain.

For further confirmation of the opinion that astigmatism according to the rule, is habitually corrected by partially closing the eyelids, a convex lens of 2 or 3 D. is placed before the eye with its axis horizontal, and it is found almost or quite impossible to read No. 1, Jaeger, without partially closing the eyelids, or what amounts to the same thing, holding a horizontal slot before the eye. If the convex lens is held with its axes vertical, rendering the eye astigmatic contrary to the rule, No. 1, Jaeger cannot be read with the eye open or partially closed, and the horizontal slot does no good; but the vertical slot at once clears the page. The eyelids cannot make the vertical slot.

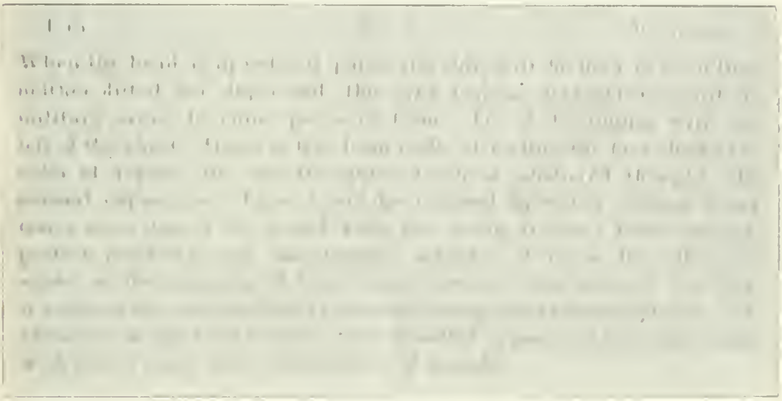


Fig. 3.—Myopic Astigmatism according to the rule.

In reading, the eyes are usually directed downward, and the lids are more or less closed, and by reason of this relation of the eyes and book, a person having slight astigmatism according to the rule, finds no embarrassment in reading, neither is the ciliary muscle subjected to the least strain. This holds true when the astigmatism amounts to 1 or 2 D. On the other hand, a person having only a slight degree of astigmatism contrary to the rule, or in any one of the oblique angles, except perhaps within 10° of the perpendicular, will either not be able to see print at all, or will find reading very painful, if continued beyond a few minutes.

There is an apparent exception to this last statement in cases where the accommodation changes a myopic to a hypermetropic astigmatism, thereby changing the meridian in focus 90°. Experiments made on the eyes of numerous individuals seem to show that the result of trials with the test types for near vision, are not always uniform; and as this difference is evidently due to the interference of accommodation, it was thought best for the purpose of study to get the results above described, as seen on the screen representing the retina in a schematic eye; and to make a permanent record, a sensatized plate was used. Then an ordinary camera rendered astigmatic was substituted, and photographs were taken of a few lines of print. Each photograph is marked to show the kind of astigmatism represented.

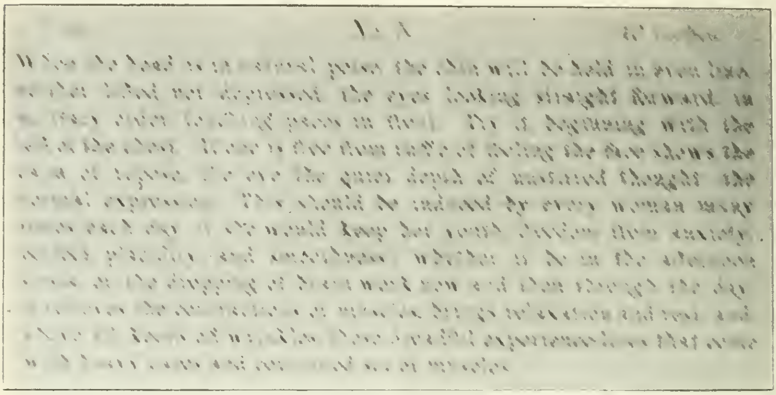


Fig. 4.—Myopic astigmatism (.50 D.) ax 45°

Reference to Figs. 2 and 3 will show that it is neither impossible nor very difficult to distinguish any word in either specimen: but, if a magnifying glass of one inch focus be placed over any word of four or five letters in either exhibit, in such a way that each letter is seen by itself, it is not easy to say what it is.

In reading we learn to see whole words at a glance, we do not see each individual letter. We distinguish the word by its general form, and if one half of the surface of the word is blotted out in such a way as not to disturb its contour, it is still easy to make out. As a result of the shortening of the horizontal focus in Fig. 2, the vertical lines are seen in circles of diffusion, while the horizontal lines are clear. While in Fig. 3, the vertical lines are clear and the horizontal out of focus. It would appear that the distinguishing form of a word is better brought out by the vertical lines alone, than by the horizontal alone.

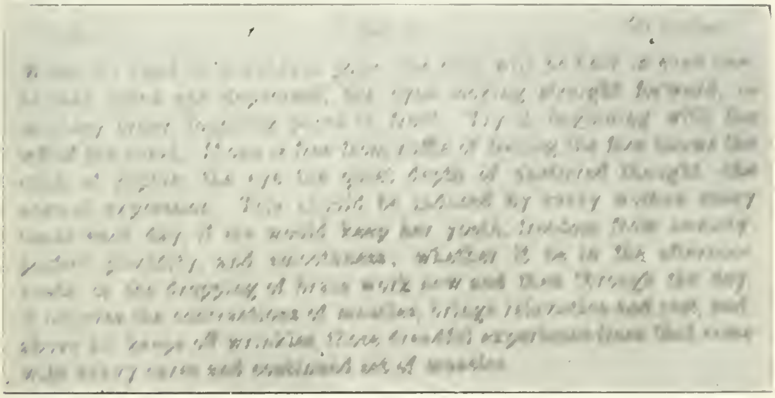


Fig 5.—Myopic astigmatism. (.50 D.) ax 135°

This is partially due to the fact, that the lines that are in focus, appear a little longer than they really are, and (Fig. 2) that when they are horizontal, they become a continuous line.

When the photographs 4 and 5 were taken, one end of the line was found to be higher than the other, showing the screw-like direction of the rays, referred to by Dr. Harold Wilson, of Detroit, in his article in the *Archivers of Ophthalmology*, July, '94.

When the two cards (one representing astigmatism of 45° and the other one of 135°) are put in a stereoscope in such a way that one card is seen with the right eye and the other with the left, it is found that one end of each must be raised from $\frac{1}{8}$ to $\frac{1}{4}$ of an inch to make the two images blend. After the blending, the ends may be carried still higher or dropped back, so as to be

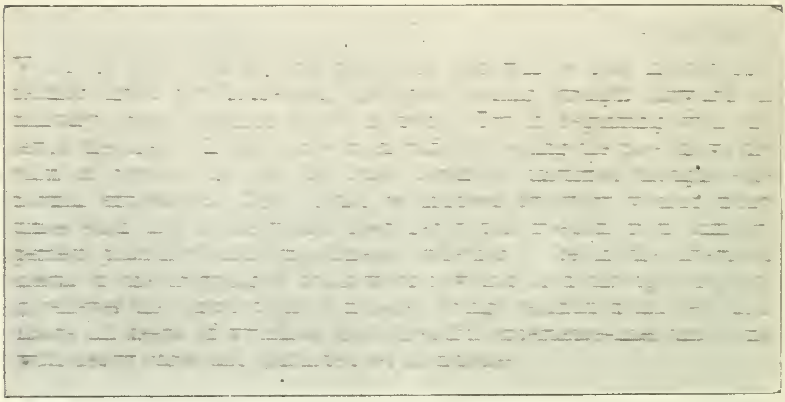
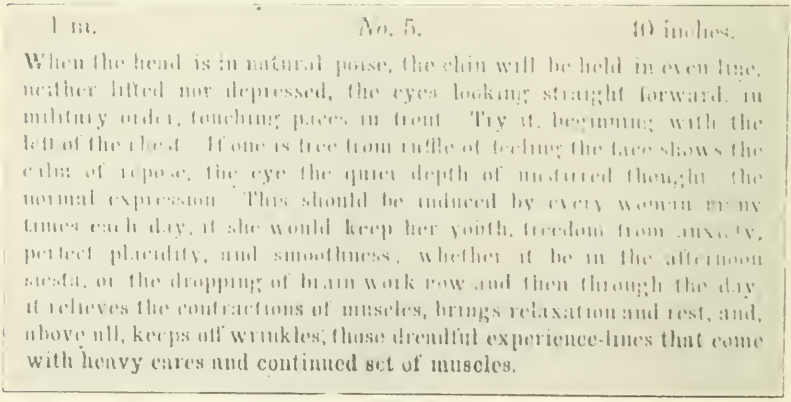


Fig. 6.—Myopic astigmatism contrary to the rule. Seen through a horizontal slot.



1 m. No. 5. 40 inches.

When the head is in natural poise, the chin will be held in even line, neither lifted nor depressed, the eyes looking straight forward, in military order, touching paces in front. Try it, beginning with the lift of the chest. If one is free from ruffle of feeling the face shows the calm of repose, the eye the quiet depth of matured thought, the normal expression. This should be induced by every woman many times each day, if she would keep her youth, freedom from anxiety, perfect placidity, and smoothness, whether it be in the afternoon siesta, or the dropping of brain work now and then through the day. It relieves the contractions of muscles, brings relaxation and rest, and, above all, keeps off wrinkles; those dreadful experience-lines that come with heavy cares and continued set of muscles.

Fig. 7.—Myopic astigmatism according to the rule. Seen through a horizontal slot.

nearly parallel without separating the images. This tends to confirm the theory of Dr. Savage, that the images in symmetrical oblique astigmatism are blended by the rolling of the eyeballs on their antero-posterior axes by the action of the oblique muscles. The two cards pivoted to a third, which fits an ordinary stereoscope and arranged to move synchronously, makes a simple and inexpensive apparatus for exercise of the oblique muscles.

The fact noted by Dr. Wilson that in oblique astigmatism the projection of the vertical line is turned in a direction contrary to the horizontal, seems not to be a practical objection to the theory of Dr. Savage, as in reading we see only horizontal lines, that is, we see whole words however long, without seeing the line above or below.

SUGGESTIONS REGARDING LEGISLATION FOR THE PREVENTION OF BLINDNESS, THE NEW JERSEY STATE LAW.*

By WALTER B JOHNSON, M. D., Paterson, New Jersey.

The subject of legislation for the prevention of blindness has absorbed much of the time and attention of ophthalmic surgeons at home and abroad: laws have been enacted in foreign countries and in the United States. The legislative bodies in New York, Maine, Rhode Island, Ohio, Maryland, New Jersey, Minnesota, Missouri and Connecticut have passed laws. These laws are in effect the same as the original statute of the state of New York, (which was enacted as a result of the untiring efforts of Dr. Lucien Howe, of Buffalo,) with the exception of the New Jersey state law which is drawn so that some of the points of weakness shown in the original laws are eradicated.

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* Read at the May meeting of the Section on ophthalmology, New York Academy of Medicine.

In a carefully prepared paper presented at the November meeting of the Medical Society of the county of New York, Dr. Charles H. May tabulated all of the cases of disease of the eye which had been treated during the past six years in four of the great eye and ear institutions of New York City. The tables indicate that no material decrease in the percentage of cases of ophthalmia neonatorum has occurred since the New York state law became effective.. The tables show that in 1888, 1889, and 1890, 76,366 cases of eye disease were treated and that 452 of these were for ophthalmia neonatorum, or 5.92 per thousand; while in the same institutions in 1891, 1892, and 1893, of 97,493 cases of eye disease treated, 488 were ophthalmia neonatorum, or 5.00 per thousand: the decrease in the number of cases of the disease during the three years under the law was less than one case per thousand of the eye diseases treated. The reasons given for the apparent inefficiency of the New York state law are: that the provisions of the law have not become generally known either through notification of professional men, nurses or midwives, or through the limited number of the twelve prosecutions and convictions which have occurred under the law; the latitude allowed the midwife or nurse in the selection of the person to whom the report shall be made by the term "legally qualified practitioner;" the lack of enthusiasm shown by general practitioners or oculists, (who are the main reliance in securing convictions) which is undoubtedly due to their unwillingness to submit to the distasteful attendance at court and the vexatious delays which seem to be necessary.

At the annual meeting of the Medical Society of New Jersey, held June 26, 1894, the committee on "Prevention of Blindness through Legislative Enactment," Drs. Walter B. Johnson, Charles J. Kipp, and P. A. Harris, reported the draft of an act which they recommended should be introduced at the next legislative session of the state. On motion the society resolved that the committee on "Legislation for the Prevention of Blindness" be continued, and requested to have the act drawn and introduced at the next session of the Senate and General Assembly of the state of New Jersey, regulating the care of infants suffering from communicable eye disease, and that the act be introduced as endorsed by, and its passage requested by the Medical Society of New Jersey.

The following act, known as senate No. 91 was pursuant to the resolution of the society prepared by the committee and introduced by the Honorable Robert Williams, of Passaic county, February 4, 1895, entitled

AN ACT for the Prevention of Blindness in the State of New Jersey.

1. BE IT ENACTED *by the Senate and General Assembly of the State of New Jersey*, That should one or both eyes of an infant become inflamed, swollen or reddened, or show any unnatural discharge at any time within two weeks after its birth, and no legally qualified practitioner of medicine be in attendance upon the infant at the time, it shall be the duty of the midwife, nurse, attendant or relative having charge of such infant to report the fact in writing, within six hours, to the local board of health of the city, township or other municipality in which the parents of the infant reside.

2. *And be it enacted*, That the said local board of health shall direct the parents or person having charge of such infant suffering from such inflammation, swelling, redness or unnatural discharge of the eyes to immediately place it in charge of a legally qualified practitioner of medicine, or in charge of the physician of the city, township or other municipality if unable to pay for medical services.

3. *And be it enacted*, That every local board of health in the state of New Jersey shall furnish a copy of this act to every legally qualified practitioner of medicine, and to each person who is known to act as a midwife or nurse, in the city, town-

ship or other municipality for which such board of health is appointed; and the secretary of state shall cause a sufficient number of copies of this act to be printed, and to supply the same to such officers for distribution.

4. *And be it enacted*, That any failure to comply with the provisions of this act shall be punished by a fine not to exceed two hundred dollars, or imprisonment not to exceed six months, or both, upon conviction under prosecution proceedings to be brought by any local board of health.

5. *And be it enacted*, That this act shall take effect and be in force on the first day of May, one thousand eight hundred and ninety-five.

The act seems to have overcome most of the objections urged against the others of a similar character. It passed both houses and became a law upon the signature of the governor, March 11, 1895, and is now known as "Chapter 118, Laws of 1895." It provides for sole jurisdiction by local boards of health.

It compels the immediate placing of the infant under the care and treatment of a legally qualified practitioner of medicine. It provides for the preparation and distribution of copies of the act to every physician, nurse, or midwife in the state. It fixes a penalty and places the prosecution proceedings in charge of the local boards of health.

The question of the advisability of placing the desease ophthalmia neonatorum upon the board of health's list of contagious and infectious diseases and compelling a report of all cases, whether under the care of a legally qualified practitioner of medicine or not, was favorably considered by the committee, as a record of all of the cases of ophthalmia neonatorum occurring in a state with the reportof the results would be invaluable for statistical purposes. The fear that a clause compelling a report from physicians might raise a barrier to the passage of the act prevented its introduction. It is extremely desirable in the opinion of the writer that future efforts shall be directed towards the compulsory report of all cases of ophthalmia neonatorum to local boards of health who have the necessary counsel, organization and means to carry on the prosecution in all cases of non-compliance with the law.

BLINKING (LID-CLOSURE) AS A MEASURE FOR EYE FATIGUE.

By DR. R. KATZ, St. Petersburg.

Translated from Klinische Monatsblatter fur Augenheilkunde by Dunbar Roy. A.B. M. D., Atlanta, Ga.

The fatigue which one notices in the eye when reading is dependent upon an irritation of some one of the following structures:

1. The internal muscular apparatus—by means of the accommodation.

2. The external apparatus—preferably the internal recti by means of convergence.

3. The light perceiving apparatus—the retina—by means of the rays of light.

4. The conjunctiva—through the heat rays.

By excessive irritation or irritability of these parts of the eye, the fatigue increases to even a pathological condition, this constituting the so called asthenopia, which is distinguished respectively as accommodative, convergent, retinal and conjunctival asthenopia.

That an active muscle becomes fatigued is well known: also, the fact that continued work by artificial light produces hyperæmia of the conjunctiva. Only in reference to fatigue of the retina is there any diversity of opinion among authors; while, for instance, Fechner, Helmholtz, Fick and others hold the same views and consider the negative after images as a sign of fatigue at that irritated point of the retina. Hering, on the other hand, considers the negative after image as an expression of equilibrium in the chemical changes of the nerve substance in the retina, whereby white as well as black passes into neutral gray.

By continued fixation of a point on the printed side of a paper, the contrast between the black letters and the white background will be continually less, and finally all the letters will disappear as in a cloud. Whether we now also consider the phenomenon as a sign of fatigue, or an effort at equlibrium, yet in any case the fact remains evident that under certain circumstances the light perception decreases and consequently a disturbance in the function of the retina does occur.

In such a sense we may be permitted to speak of retinal fatigue.

Now, the question arises whether the fatigue of the eye can be recognized both subjectively and objectively, and in that case whether the degree of fatigue can be estimated? By solving this question by means of functional testing of the eye, one will arrive at either vague or very negative results. The cause of this lies in the fact that compensating influences are at work upon the eye at the same time with those causing fatigue. According to E. Fick's opinion the following serve as compensating factors for the fatigued retina—lid-closure, movements of the eye, and change in the accommodation.

Each one of these factors aids in holding the wavering points steady, while all of them together cause it to be entirely distinct. The two last factors are constant in reading, while only the first—the winking—appears sometimes frequently, and again seldom.

E. Fick has shown, according to his own observations, that the frequency of lid-closure increased with the degree of retinal fatigue. My own observations prove that not only the fatigue of the retina but also the exercise of accommodation and also convergence adds much to the frequency of the lid-closure.

That hyperæmia of the conjunctiva also causes an increased winking—being a simple reflex contraction of the M. orbuislaris palpebrarum from the irritated endings of the trigeminal nerve—one can readily convince himself by observing the blinking which occurs in daylight and also artificial light under which the eyes, unprotected, are exposed to the direct influence of the heat rays.

From what has been said, it follows that fatigue of the eye is characterized by a frequency of lid-closure. In thus observing the blinking of the lids, we possess an objective, and at the same time a simple, method for estimating the degree of eye fatigue. That this method is trusty is shown by the following experiments: These were conducted by me—upon my own eyes—by means of a modified Marey's Myograph (with air conduction) in the physiological laboratory of the University at St. Petersburg. The box with the hook upon the lever was fastened to the temple, while a thread tied to the hook was attached to the outer angle of the orbit by means of the end. With every lid-closure, the skin at the outer angle of the orbit was drawn in towards the eye. In this manner the thread drew upon the hook, thus transferring the motion by means of a caoutchouc tube to the writing lever of the other box, which finally marked every lid-closure upon the surface of a moving cylinder.

I will mention here three observations, which were conducted under different kinds of illumination:

1. Electric illumination (Edison's incandescent lamp) by means of a metallic reflector hidden from the eye. The book was illuminated with strong 10 to 12 meter burners. Length of observation ten minutes. It was read at the distance of about 30 cm. During the first five minutes there was blinking

five times; during the second five minutes thirteen times. The frequency of blinking to the minute was about $=\frac{5+13}{10}=1.8$.

2. Gas illumination (open burner). The other conditions as above. First five minutes nine lid-closures; second five minutes nineteen. Frequency of blinking 2.8 to the minute.

3. Weaker illumination, reading was done with difficulty at a distance of 16 to 18 cm. First five minutes gave 25 lid-closures; second five minutes 43. Frequency of lid-closures =6.8.

It requires no long statement over the practical worth of determining the degree of ocular fatigue. It suffices to simply mention the vexed question of artificial illumination in schools which can be solved only by determining the degree to which the eye is fatigued by the respective methods of illumination.

REPORT OF A CASE OF PARALYSIS OF ACCOMMODATION.

By R. H. T. MANN, M.D., Texarkana, Ark.

W. E. aged fifteen was sent to my office by his family physician because he was unable to read and, also, because his pupils were very much dilated. I found, upon examination of his eyes, that his vision was normal for the distance. He could not see to read at all with the naked eye, but with a plus 2.50 spherical lens he could see to read the finest print. This clearly showed it was not a case of opacities of the media, disease of the retina, or choroid; if there had been there would have been disturbance of vision at any distance. My patient was suffering with paralysis of accommodation.

His health had not been good for a number of years. In fact, his mother told me that I had "her much afflicted son" for a patient. Three years before he had suffered with a severe attack of inflammatory rheumatism. A six weeks stay at the Hot Springs of Arkansas had entirely relieved this and he had had no symptoms of disease since. During last winter he had quite a severe attack of throat trouble; but as his physician was not in the city I could not learn the history of the case.

I put my patient on ten drop doses thrice daily of the saturated solution of iodide of potassium. Ordered a bath every other day and much time to be spent out of doors. In addition to this, during the second week I instilled one drop of 1% solution of pilocarpine in each eye. This was continued for two weeks. After the pilocarpine was discontinued for several days my patient could read the smallest print with ease. He returned to his regular duties with his eyes apparently as well as ever. I cautioned him to be careful not to read more than one hour a day until he re-entered school in the fall.

This trouble is not likely to recur as my patient's health is very much improved. I regard paresis of accommodation no more in muscular weakness of the eye than the muscular weakness of convalescents in general.

SCIENTIFIC PROCEEDINGS, SECTION OF OPHTHALMOLOGY A. M. A., BALTIMORE MEETING, MAY, 1895.

Papers in abstract; discussions in full.

Continued from Page 28, Current Volume.

HISTOLOGICAL AND BACTERIOLOGICAL NOTES ON SOME CASES OF PENETRATING WOUND OF THE EYEBALL, TOGETHER WITH SOME OBSERVATIONS ON CERTAIN BACILLI FOUND IN A CASE OF POST-OPERATIVE PANOPHTHALMITIS.

By G. E. de SCHWEINITZ, M.D., Philadelphia, Pa.

Dr. de Schweinitz, after briefly reviewing recent experimental researches relating to the etiology of panophthalmitis, described

(1) A case of traumatic irido-cyclitis, with retained foreign body (piece of steel) in the left eye, followed by sympathetic serous iritis of the right eye. Enucleation of the excitor was followed by complete cure of the sympathetic inflammation. Cultures were not made from this case; but the microscopic examination of the specimen, which presented the typical lesions of malignant uveitis, did not reveal micro-organisms.

(2) A case of lacerated wound in the upper ciliary region with irido-cyclitis and cataractous lens of the left eye, followed by sympathetic uveitis of the right eye and marked constitutional symptoms—headache, fever and emaciation. The excitor was removed, and a bacteriological examination was made of the divided end of the optic nerve and of the intervaginal space. Tubes inoculated from these regions remained sterile. Suitably stained and serially cut sections were entirely free

from micro-organisms. Histologically this specimen showed the typical lesions of malignant uveitis.

(3) Penetrating wound through the upper ciliary region, with retained foreign body (piece of steel) in the vitreous; beginning purulent irido-cyclitis on the fourth day after injury; no signs of trouble in the opposite eye. The injured organ was removed and bacteriological examination was made of the divided end of the optic nerve, the intervaginal space, the interior of the vitreous and the area surrounding the wound of entrance, with the result of the development of growths in tubes inoculated from all these areas, the micro-organisms proving to be the *staphylococcus cereus albus* and *staphylococcus pyogenes citreus*. Suitably stained sections exhibited here and there cocci in the purulent areas. The histologocal examination showed acute hemorrhagic and purulent irido-cyclitis with beginning purulent choroiditis.

Although the *theory of infection* is probably correct, it was pointed out (1) That in the main these causes failed to add confirmatory testimony to the hypothesis of a *migratory ophthalmitis* as the explanation of the phenomena ordinarily known as sympathetic ophthalmia; and that even in the third case, in which the germs of suppuration were demonstrated, their presence was merely the natural result of the active suppurative process that then existed. (2) That neuritis of the ciliary nerves was present in about the same proportion as it is customary to find this lesion under these circumstances: and (3) That the constitutional disturbances in Case II indicated a general as well as a local infection, and were interesting as bearing on the theory, sometimes advanced, that the metabolic products of the organisms, and not the organisms themselves, set up the inflammation, although a single observation of this kind could only be valuable when it had been confirmed by careful investigations of the temperature, pulse and respiration in other cases of sympathetic ophthalmitis.

The second portion of the paper was devoted to the description of a case of post-operative panophthalmitis, in which, after evisceration, the scleral contents were submitted to bacteriological examination, with the result of the isolation of a rod-like bacillus three to four times as long as broad, and often growing in chains, or with several joined together. Pure cultures of this growth were obtained and inoculations made in the anterior chamber of rabbits' eyes with entirely negative results, the organism, although profusely present, being entirely non-pathogenic. In addition to it, however, cocci were found, which on isolation proved to be *staphylococcus pyogenes citreus*, and these alone, or a mixed culture from the vitreous, when similarly inoculated, were promptly followed by reaction.

The paper closed with a brief description of the various bacilli which had been found in connection with panophthalmitis and the need of carefully excluding pathogenic cocci before ascribing the suppuration to bacilli was urged. Microscopic slides and photo-micrographs were used in illustration. Dr. de Schweinitz expressed his especial indebtedness in the bacteriological portion of the paper to Dr. D. Braden Kyle, of Philadelphia, to Dr. E. A. de Schweinitz, of Washington, and to Dr. Wm. M. Gray for the micro-photographs.

DISCUSSION.

Dr. R. L. Randolph, Baltimore, Md.: I have been much interested in the paper just read, not only on account of its own value, but because the author's investigations were made along a path that I have traveled myself during the past two years. Panophthalmitis presents a typical picture of a suppurative inflammation, and one would think that as such the *staphylococcus aureus* or *albus* or certainly some one of the so-called pus organisms, would be revealed by a bacteriologic examination. Such though has not been the case. Haab and his assistant, Poplawski, reported thirteen cases of panophthalmitis and in every case a bacillus was found to have been the cause of the inflammation. Two years ago I reported a case of panophthalmitis caused by the bacillus *coli communis*, the latter organism being found in the eyeball in pure culture. The paper of Dr. de Schweinitz just read also records the finding of a bacillus. It is difficult to explain how the bacillus in pure culture is usually found. We know that the conjunctival sac is the resting place for various kinds of bacteria, and it is not likely that simply one kind of organism passes into the eye and that always a bacillus. May be the bacilli as a class are of a hardier nature and more luxuriant growth than the micrococci, and the latter, though present in the eyeball, are crowded out and finally supplanted by their stronger brothers. It is singular too to note the fact that the bacilli found in most of these cases are to be regarded as, comparatively speaking, harmless organisms. They are not, truly speaking, pathogenic organisms and yet when introduced into the eyeball they produce the most intense and destructive form of inflammation. When introduced into the conjunctiva the reaction is insingificant. These facts among others go to show that there are many organisms other than the so-called pus organisms that are capable of producing suppuration, and that organisms ordinarily harmless, possess sometimes marked pathogenic properties.

Dr. Harold Gifford, Omaha, Neb.—The opinion in regard to the cause of sympathetic ophthalmia seems to be changing, as is the result whenever a new theory is found. The pendulum is swinging away from the germ theory, and I cannot but feel that it is a retrogressive step. Dr. de Schweinitz found foci of inflammation in his cases—what caused them? In these eyes the germs were not found, but that does not necessarily show that they had not been present. If any of you have examined eyes bacteriologically, you realize how difficult it is to find these germs. When staining for germs in the tissues, even the tubercle bacilli are very hard to find. There are two points to be considered. First, in this region wounds are very common. Bacteriological examinations after experiments upon rabbit's eyes, show that the tissues of the ciliary bodies are most excellently suited to the growth of germs. As Dr. de Schweinitz remarked, a number of these experiments have failed to confirm Deutschmann's results in this matter. I failed to find them in any case in the optic nerve region, but did have them in the ciliary processes in large quantities. In the other parts of the eye you will find them comparatively scarce. This may explain one reason why wounds in the ciliary region are so dangerous. How can you account for an inflammation which starts in an eye, creeps along and produces all the disturbances that follow, upon any ciliary nerve theory? In regard to the germs found in eyes with panophthalmitis, I have been surprised in many cases at not finding the germ I was looking for, but in a number of them did find what looked like Sternberg's diplococcus more generally known as Franklin's. I failed to find them in stained preparations. In one case I had a short time ago, I found pus germs. It seems to me a very important point to bring out here is the resisting point of bacilli. You all know that bacilli are more likely to have spores than micrococci, and are more resisting to antiseptics. In noting the precautions taken for operations, I find such remarks as this: "Instruments dipped into boiling water," or "put into 2% carbolic acid." I think we should not be content with less than five minutes boiling. Pus cells may be killed in one minute, but we should not only take account of these germs, but also the possibility of germs that have spores.

HEMORRHAGE INTO THE RETINA AND VITREOUS IN YOUNG PERSONS ASSOCIATED WITH EVIDENT DISEASES OF THE RETINAL BLOOD VESSELS.

By HARRY FRIEDENWALD, Baltimore, Md.

The writer described two cases of hemorrhage into the retina and vitreous. In the first a sub-hyaloid hemorrhage occurred while under observation. It was at first situated above the macula, but slowly moved downward, rested over the macula reflex, then glided down around the latter to occupy later on a position below the macula. In its passage from its first to its last position, it gave evidence of the dense union between retina and hyaloid membrane around the macular region. The veins showed disease: they were overly distended, presented irregular dilatations and contractions and a definite varix. Later recurrent vitreous hemorrhages were observed. During the course of the disease, the development of fine vascular growths arising from the veins and projecting into the vitreous was seen. These gradually and very slowly developed into large connective tissue masses (retinitis proliferans). The only etiological factors were possibibly slight anemia and intermittent fever.

In the second case there was a profuse vitreous hemorrhage which had cleared up, leaving a long, narrow, fibrous growth jutting far into the vitreous from the papilla. The field of vision presented a large sector-like defect. There were a number of small varices on the veins. In this case the only etiological factor was constipation. Both cases presented such marked evidence of vascular disease as to lead to the view that hemorrhage in the retina of young persons may often be due to similar conditions.

PROGNOSTIC SIGNIFICANCE OF ALBUMINURIC RETINITIS.

By E. OLIVER BELT, M. D., Washington, D. C.
Professor of Ophthalmology and Otology, Howard University, and Ophthalmic and Aural Surgeon to Freedman's Hospital.

It seems to be generally admitted that the retinitis following scarlet fever and pregnancy is not of special prognostic significance as to vision or mortality, for under careful treatment recovery of both vision and health are not unusual in these cases. Therefore, in this paper such cases have been excluded as the prognosis is altogether different and unfavorable in the retinitis of chronic Bright's disease. Though improvement of vision very frequently occurs in albuminuric retinitis, it is of minor importance in comparison with the life of the patient; and the main point which I wish to determine is the average duration of life after the appearance of retinitis from renal disease. The statistics heretofore published upon this subject deal mostly with hospital cases in which the duration of life rarely exceeds one year. Occasionally we see reported a case in private practice which has survived five, ten, and even fifteen years. (Noyes mentions one of ten years, and Webster reports the case of a minister who survived seventeen years). This led me to think that we might be able to give a more hopeful prognosis in cases which could receive good medical attention with the proper hygienic surroundings, etc. And I decided to try and find whether or not the average duration of life was greater among private patients than among hospital cases. With this end in view, a few weeks ago I requested quite a number of ophthalmologists throughout the country to report the cases which had occurred in their private practice to me. The time allowed was too short for many to look over their records, and many had not kept trace of the patients after referring them back to the family physician; but enough cases were reported to show that the duration of life is longer among private patients, and that the renal affection is undoubtedly influenced by the hygienic surroundings. However the number of those surviving two years was disappointingly low; and the consensus of opinion, as shown by the following extracts from letters received, seems to be that nearly all prove fatal in less than two years.

Dr. G. E. de Schweinitz, of Philadelphia, says: "So far as I know, there is no case in my private practice that has lived longer than two years after the development of the retinitis."

Dr. J. L. Thompson, of Indianapolis, says: "Have had between fifty and one hundred cases scattered through my books in a private practice of twenty-four years. Several of my patients have died within thirty days; while others have lived two years. Many more die within six months after its first manifestation in the eyes than live after that period."

Dr. Walter B. Johnson, Paterson, N. J., says: "In many cases the retinitis was the first indication of kidney disease, which after discovery almost invariably progressed very rapidly."

Dr. Peter D. Keyser, Philadelphia, says: "That the length of life depends upon the retinal appearance at the time of first examination. In well marked cases I should say an average of twelve months, if the patient is under good medical care. I have had some cases to run two years, others only three months."

Dr. L. A. W. Alleman, Brooklyn, N. Y., says: "Save in cases due to pregnancy I have never seen a pure case of albuminuric retinitis last over a few months from the time it has come under my observation."

Dr. Samuel D. Risley, Philadelphia, says: "My impression is that, after the appearance of eye symptoms, nephritis is rapidly fatal. I recall cases of death occuring within a few weeks, and cannot recall one which did not prove fatal inside of two years, whether associated with pregnancy or not."

Dr. G. C. Savage, Nashville, Tenn., says: "My recollection of these cases is that they die within two months, and I do not remember a single case that lived longer than five months."

Dr. Chas. W. Kollock, Charleston, S. C., says: "In no case in my practice has any such patient lived out the year."

Dr. Peter A. Callan, New York, says: "My impression is that the majority die under two years after the onset of the retinal changes; but there are exceptional cases, one of which has now lived nine years since I first made out that she had kidney trouble with the eye complication."

Dr. George T. Stevens, New York, says: "I observe that some of our colleagues think that a fatal termination is to be expected within a few months after the discovery of the albuminuric retinitis. I can recall to mind quite a number of people who have survived several years. Mrs. K. survived more than eleven years after I found well marked retinitis albuminurica. This is not, I think, a specially exceptional case."

Dr. David Coggin, Salem, Mass., says: "Of thirty fatal cases I remember but two who lived over six months."

Dr. C. S. Turnbull, Philadelphia, says: "My experience has in a general way led me to believe that the time is most variable, depending greatly upon the varied forms of renal disease in different individuals."

In all the statistics I have been able to find, we get the following results.

Cases in private practice 155: of these 62% died within one year, 85% in two years, and 14% lived more than two years..

Hospital cases, seventy-seven: of these 85% died within one year, 93% within two years, and 6% lived more than two years.

Mixed cases 187: of these 65% died within one year, 93% within two years, and 6% lived more than two years.

Total number of cases 419: of these 72% died within one year, 90% within two years, and 9% lived longer than two years.

EXTENSIVE COLLOID CHANGES IN THE CHOROID WITH REPORT OF CASES.

By JNO. T. CARPENTER, Jr., Philadelphia. Pa.

Most reported cases show a decided relation between senility and the appearance of colloid degeneration of the Lamina Vitrea Choroidæ, which gives an ophthalmoscopic picture more or less varied, owing to the size and situation of the yellowish white globular masses.

Tay, and afterwards Nettleship, studied this under the name "guttate choroiditis." French writers have used the term "vemicosites hyalines." There is no inflammation of the choroid; and the best name would seem to be "Colloid Changes in the Choroid."

Examples of this change are seen in the capillaries of old people as well as in the cornea forming the arcus senilis (Fuchs). The intercellular substance of the lamina vitrea is probably the source of the colloid degeneration though some observers (See Terson, Arch. d'Oph. 1892) maintain that it is the epithelial cells.

Two clinical groups of these colloid changes:

Group I. In this the lesion occurs as small very numerous yellowish dots having often the diameter of the larger retinal veins with tendency to heaping in the central region.

When less numerous and in macular region only a picture simulating albuminuric retinitis is produced.

Group II. Large globular symmetrically placed choroidal masses in the macular region. Their resemblance to drusen is striking.

There is no interference with vision in these extensive lesions. The author believes the small yellowish masses in Group I. to be invariably a senile change; while the three cases reported in Group II. were all under forty years of age, but showed general disease—pthisis, chronic interstitial nephritis and gout. The clinical histories were given in detail and attention called to the absence of visual defect scotoma or even reduction of the "light-sense." Original water colors and drawings were shown of the fundus conditions. One case was important showing drusen condition of the nerve-head and large colloid choroidal lesions in the same eye. The following are the summarized conclusions:

1. The entire absence of any visual defect resulting from even the most striking ophthalmoscopic appearance.

2. The constant relations between senility and the multiple small colloid masses seen in Group I., and the absence of any such relation in Group II.

3. The almost invariable situation of the lesion in the macular region, and the symmetry of arrangement in the two eyes.

4. The importance while studying the fundus, of using a low power of illumination and of continually changing the direction of the light from the mirror in order to reveal the true outlines of these masses.

5. The clinical proof of the identity of drusen with these extensive colloid changes in the choroid, both from the standpoint of symptomatology as well as from the fact that in at least one case drusen and colloid changes existed in the same eye.

6. The importance of diagnosis from choroiditis, tubercular disease of the choroid and, in some instances, from changes due to albuminuria.

DISCUSSION.

DR. G. E. de SCHWEINITZ, Philadelphia, Pa.: As you know I have had the opportunity of studying microscopically the so-called drusen in the nerve-head and clinically several cases of choroidal disease resembling these hyaline bodies in the papilla. Thus far at least it is unproven that the drusen and the colloid bodies are in the laminæ. Therefore I am doubtful whether all these cases should be grouped together, although I am sure we should all agree with Dr. Carpenter that they constitute a class of cases to be separated from inflammatory disease. My experience with guttate changes is that they always produce defective central vision and negative scotoma, while these colloid macular changes in young people are not connected with defective central vision, indeed, even the light sense is perfect. Drusen may be seen in otherwise normal nerve-heads or in one that is atrophied; therefore they may be associated with and without visual disturbance. Symmetrical disposition of the drusen is not universal. I have reported on one monolateral case and studied another. Dr. Gifford, I know, is now studying a similar unilateral case. On the other hand the colloid changes in the choroid in my experience are always symmetrical. Dr. Carpenter's cautions in regard to the best method of studying these lesions are timely.

Dr. B. Alexander Randall, Philadelphia, Pa.: Several pathological conditions are comprised in these "colloid" appearances as many of us have doubtless seen—colloid degeneration of the retinal pigment epithelium—colloid deposits in the choroidal stroma, and similar lesions in the retina akin to the more serious vacuolization that is so commonly seen at the periphery. In a considerable group of clinical cases it has seemed impossible often to discriminate which process was present in the ophthalmoscopic picture.

Dr. Harold Gifford, Omaha, Neb.: I have followed some cases of this disease for several years. One case occurred in a girl nine years of age with a very remarkable change in the optic nerve. This case I report as an exception in that the sight was entirely destroyed. The retinal arteries were obliterated, whether as the result of colloid changes or of some other disease, I am uncertain. One point you should consider is: What sort of prognosis are you going to give? Will they retain what vision they have through life? I have had a case in which sight was reduced to $\frac{20}{50}$ by these changes, that is, I could find no other cause for the reduced vision.

Dr. Herman Knapp, New York.: I wish to acknowledge the value of Dr. Friedenwald's paper. The subject of hemorrhages in the background of the eye is larger and more important than we formerly thought. Many of the various appearances of striation and white or black deposits, which were formerly complained of, can now be referred to previous hemorrhages, after we have had time to watch a large number of cases where the gradual conversion of the blood into these conditions could be followed up.

As to the clinical course of the colloid excrescences of the choroid, I have the advantage of age over most of you in stating that for many years they can remain in *statu quo*. In a gentleman whose eyes had extensive colloid deposits in the choroid, they have not notably changed these twenty years. Regarding the differential diagnosis, those excrescences may be mistaken for a disseminate choroiditis as it occurs in syphilis. In the latter disease the small patches have a somewhat notched border beset with pigment (as the colloid occasionally are, too and their color is white, the white of the sclerotic, whereas the colloid deposits look dull white like old ivory.

DR. J. T. CARPENTER JR., Philadelphia, Pa.: I am glad to hear from others that the question of diagnosis between disseminated choroiditis and some cases of extensive colloid choroidal degeneration has been one of some difficulty. The grouping of these cases was done simply from a clinical standpoint. The prognosis is invariably good as regards vision; and Dr. Gifford's cases must have been of serious optic nerve lesion, probably posterior to the papilla.

(To be continued.)

EDITOR RECORD:—Please correct as follows, the RECORD'S July report of my remarks on Dr. Baker's paper on Incipient Cataract.

I said speaking of twelve cases of incipient cataract reported by me to the Detroit Meeting of the A. M. A., *none* of which have since required operations—that as seven of said cases had each one advanced on mature cataract at the time of treatment of their incipient cataract, they certainly did not belong to the class that have no tendency to mature, as it is well-known that cataracts follow about the same course in each eye. I gave my treatment as iron tonics, with galvanism and iodine applications to the eye.

A. J. ERWIN,
Mansfield, Ohio.

THE OPHTHALMIC RECORD,

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G. C. SAVAGE, M.D., Editor and Publisher,

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Bad Type.

Some bad type, in some way or other, got into the last issue of the RECORD. We have interviewed our printers on that point, and feel sure that this will not be repeated.

Missing Numbers.

Again we would call the attention of our subscribers to the fact that we have already promised to furnish them, free of cost, any copies of the RECORD that may have been lost from their files. The one exception is that we are unable to furnish a single number of Volume 1, without breaking a complete volume, of which we have very few copies. If you have not looked over your files to see if any are missing, please do so at once, for we cannot long hold this proposition open.

Two Sides to Every Question.

There must be two sides to every question. Questions pertaining to medicine can be no exception to this rule. One side must be true, and the other must be false. It should be the object of every investigator to get on the right side of every question.

Human judgment not being infallible, any man may sometimes be found on the wrong side of a question. To change one's views is no disgrace. On the contrary, he is not to be envied who, having been convinced of his error, persists in holding on to it.

The editor of the Record has on more than one occasion, in conversation with confréres, asked them for contributions on certain subjects. He has more than once gotten the reply from the one interviewed, that he held views differing from those of the editor, and therefore did not feel like occupying space under the control of the latter. To all such, the reply has been that the pages of the Record are freely open for the presentation of both sides of any question. A man holding views different from those advocated by the editor, will be given space for the expression of his views just as freely as if we were both on the same side of the question.

It is only by discussing the different views that the truth can be brought out and established. When anything appears in a contribution to the Record, or in any editorial, that does not meet the approval of any confrére anywhere, it is a duty that he owes to the profession to give his reasons for not believing in such teaching. The one thing that we will demand of those in controversy, is that they deal not in personalities. What readers want is argument and not ridicule. With this single restriction, the pages of the Record are thrown wide open for the discussion of any subject pertaining to ophthalmology.

Somebody Must Pay in Advance.

If the above fact were appreciated by subscribers, a greater number of them would pay their subscriptions in advance. If subscribers do not pay in advance, the publisher must. Paper must be paid for; type-setters and pressmen must have their pay promptly; postage must be paid at the time of mailing; every-one connected with the office of a medical journal must be paid, with the single exception of the editor, who, so far as special journals are concerned, receives nothing for the necessarily heavy labor which he performs in conducting the journal.

A pink slip was enclosed in every copy of No. 1, Volume 5, showing the exact amount due from each individual subscriber. Many of the subscribers have already responded by sending in the amount due. ALL subscribers would doubtless have done so if they had only appreciated the fact that it is much easier for a man to pay the small sum of $2.00 in advance, than it is for the editor to pay the large sum every month, necessary for the bringing out of the RECORD.

The Wills Eye Hospital Reports.

Under the above name has been commenced a new periodical publication, devoted to Ophthalmology, No. 1, Volume 1, having just appeared. In addition to the usual matter found in hospital reports, there are numerous papers by various authors, most of whom are connected with the hospital as surgeons. Under the editorial management of Dr. C. A. Oliver and his co-laborers, this new venture cannot do otherwise than succeed.

Dr. Edward Jackson's Book on Skiascopy.

This little book is a timely contribution to an important study. In the first chapter he gives the history of this objective test, mentioning the several names by which it has been called by various writers, and gives his reasons for preferring the name which he makes the title of the volume. The difficulties in the way of the mastery of the subject are pointed out. He closes this chapter by discussing "how to study the test."

In chapter two, the general optical principles on which Skiascopy is based, are plainly set forth. In chapter three, he deals with the "conditions of accuracy." In chapter four, he discusses regular astigmatism as determined by Skiascopy, while in chapter five he writes of "Aberration and irregular astigmatism."

He describes the use of the plane of mirror in chapter six, and that of the concave mirror in chapter seven. The eighth and last chapter is devoted to "general considerations."

Altogether, this little book of 109 pages is one so full of practical information that it should be studied by every one, who is not a thorough master of the subject treated. The cost is $1.00.

Section Dinner.

According to the custom of the Section of Ophthalmology, the annual dinner was indulged in at the Rennert Hotel, Baltimore, on the 7th of May. A large number of the members were present, and seemed to enjoy the occasion. To attend this dinner all had to forego the pleasure of attendance on some public receptions. In the course of the dinner a number of toasts were responded to. One of the responses was by Dr. Lucien Howe. In the course of his remarks he suggested that oculists ought to do something in recognition of the gift of cocaine to the profession by Dr. Carl Koller, of New York. The resolution seemed to meet with general approval, but no difinite action was taken. It is certainly a proper thing to express our appreciation for benefits received to the person who conferred them while he lives, rather than indulge in praises when he is dead. Once the husband said to the wife: "If you have any roses for me, give them to me while I am living. Do not wait until I am dead and then come with them and say, here, Brown, smell these."

It is well to honor the memory of the dead; it is better to manifest our gratitude for benefits received while the benefactor lives.

THE

OPHTHALMIC RECORD.

VOL. V. SEPTEMBER, 1895. NO. 3.

AMBLYOPIA EX ANOPSIA.*

By WALTER B. JOHNSON, M.D., Paterson, N. J.

At the twenty-ninth annual meeting of this society, a case of amblyopia ex anopsia was reported under the title, "amblyopia from suppression of the visual image." Subsequently, another case under the same title was presented at the November meeting of the New York Academy of Medicine, and published in the *American Journal of Ophthalmology*, January, 1894.

These cases, in each of which the useful eye was destroyed by accident, established the fact that loss of vision from the amblyopia of disuse, certainly could, and did, exist without any diseased condition being present, either in the eye itself or in the cerebral centers as was indicated by the resumption of normal vision.

The rapid recovery of perfect vision in the amblyopic eye in each case (within fifteen days), admitted no explanation, except that loss of physiological sensibility had occurred through psychical exclusion resulting from unconscious suppression of the visual image. This amblyopia ex anopsia was immediately overcome, when the stimulus of exclusive perception incited the functional activity of the dormant, but not diseased, cerebral centers. The case here reported is one of amblyopia ex anopsia, which was undoubtedly the result of confusion of the visual image from a conjugate deviation to the left occurring at an age, when definite and positive statements could be made by the patient under examination. The vision in each eye was perfectly normal at the time of examination, which was made seven months after an injury to the brow had occurred. This would preclude the possibility of any structural change either in the eye or cerebral centers entering, as a result of the accident, as an etiological factor in the production of the amblyopia. The left eye of this patient, which at the first examination had perfectly normal vision, became progressively amblyopic after the severe disturbance of the ocular muscles; developed the condition of discomfort resulting from confusion which necessitated suppression of the visual image to reëstablish comfort.

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*Read at the thirtieth annual meeting of the American Ophthalmological Society, New London, July, 1895.

The question of the time when amblyopia will begin to develop, or when vision will be lowered after absolute suppression of the visual image has been attained, is difficult of solution. In the case reported, the improvement in the distressing symptoms occurred before the vision in the left eye was affected, and was without doubt the result of mental suppression, although the amblyopic condition was not yet present. Psychical exclusion, it would appear, must be constant and continued in order that a loss of physiological sensibility may induce the amblyopic condition.

A very intelligent patient, whose occupation as an engraver upon zinc necessitates the use of a magnifying glass for the right eye constantly each day, stated that he thought he could suppress the vision of the left eye in single vision at will; he writes as follows: "I have found by repeated trial that my left eye sees nothing after I have looked continually through the magnifying glass with my right. It seems as if a fog passed before it, but this only happens while my attention is concentrated upon the magnified object. As soon as I relax attention from the object, even slightly, the sight appreciably returns to the left eye. I cannot suppress the sight of the right eye at will." This business is of an unusual character, and can only be performed by two other men in this country, who are compelled to close the left eye while at work. He has been engaged in it for years; and the vision in the left eye remains perfectly normal. The magnifying glass used is a strong lens situated at a distance from the eye, and is not placed before the eye like the well-known watchmaker's monocular.

The inference, that the loss of sight increases in a ratio proportionate to the time of the existence of the suppression of the visual image, is clearly sustained in this case by the quality of the vision in the left eye ($\frac{20}{20}$) up to the period of time, when the patient was enabled to resume her school work without any material discomfort.

There would seem to be no doubt but that the existence of the deviation, being a source of irritation to the cerebral centers, resulted in the production of the symptoms described in the history of the case which follows, and that the unconscious mental suppression of the visual image in the course of time induced *per se* the amblyopic condition.

L. P., female 10 years of age, born in the United States, applied for treatment July eleventh, eighteen hundred and eighty-five. She stated that she had always enjoyed good health, but had suffered from, more or less, frequent headaches attended by nausea. Since childhood, at four years of age, she had scarlet fever. Her mother and father gave a history of migraine.

The patient, seven months prior to her present visit fell, striking the left forehead, and inflicting a lacerated wound over the frontal eminence about one inch in length, extending in an oblique direction from within upwards, about one and one quarter inches above the left brow.

The wound united in the usual manner without the development of any complications, leaving a cicatrix which is plainly visible at the present examination. The mother thinks the child has suffered from more frequent and severe headache since the time of the injury, although she has been able to constantly attend school, until one week ago when she returned complaining of left frontal headache, which was so severe that she was unable to use her eyes for anything, and was very much distressed by nausea and vomiting.

The headache persisted daily, and on the third day after its onset, was attended by bleeding from the left nostril. Her nose bled ten times during the next five days, a few minutes each time. She had been afflicted by nose-bleed previously, but not since the time of the injury as here noted.

On the third day after the onset of this severe headache, her mother also noticed that she could not turn her eyes to the left side, and carried her head to the left. She could neither turn her head to the right nor carry her eyes to the left, and complained that it caused severe pain and discomfort whenever she attempted to do so.

Upon examination a marked conjugate deviation to the right was disclosed. She could neither carry the left eye out nor the right eye in, even to the median line, either conjointly or singly with either eye crossed.

R. V.=$\frac{20}{20}$, no improvement with glasses.
L. V.=$\frac{20}{20}$, no improvement with glasses.

The ophthalmoscopic examination revealed a perfectly normal fundus in each eye. July 18th, the case was referred to Dr. R. W. Amadon, whose examination resulted in a confirmation of the previous examination, and to the best of my recollection a diagnosis of a probable hysterical element as an etiological factor in the production of the condition. His report in detail has been unfortunately mislaid. October 18th, in response to a letter of enquiry from Dr. Amadon, the following was sent in reply: "The patient called yesterday, and upon examination was able to carry the pupil of the left eye, 1‴ to the left of the median line, which is 2‴ better than she could do when you examined her. She is in good health and has attended school regularly for the last two months, during which time she has taken no medicine. Her mother has decided that since all of the distressing symptoms have disappeared and the child feels well, and has even less frequent headaches than she had before the time of the injury, she will not resort to any treatment for the turning of the head to the left which still persists, but promises to call again in case the symptoms should return."

R. E. V.=$\frac{20}{20}$, no improvement with glasses.
L. E. V.=$\frac{20}{20}$, no improvement with glasses.

February 4th, 1895, ten years after her first visit, the patient called with her mother, who had a subacute laryngitis and upon request consented to an examination. She still carries her head slightly to the left, and cannot carry the left eye out to the full extent; she can carry the right eye in; she complains of no headaches and no especial discomfort.

R. V.=$\frac{20}{20}$, no improvement with glasses.
L. V.=$\frac{20}{100}$, no improvement with glasses.

The ophthalmoscopic examination is absolutely negative; the fundus in each eye is perfectly normal; and there is no apparent error in the refraction of either eye. The condition present is amblyopia ex anopsia, which has progressively developed as a result of inability to attain parallelism in ocular excursion followed by psychical exclusion of the visual image which in time has resulted in physiological loss of perceptive sensibility, but not, it is believed, in any structural change in the eye itself or in the cerebral centers. The vision in the left eye would become normal, providing the stimulus of exclusive sight perception should be permanently established in that eye by loss of vision in the right eye, or in case an operation should be performed, which resulted in the attainment of perfect binocular fixation.

SCIENTIFIC PROCEEDINGS, SECTION OF OPHTHALMOLOGY A. M. A., BALTIMORE MEETING, MAY, 1895.

Papers in abstract; discussions in full.

Continued from Page 76, Current Volume.

THE TECHNIQUE OF TENOTOMY OF THE OCULAR MUSCLES.

By DR. LEARTUS CONNOR, Detroit, Michigan.

1. A good physical condition of both operator and patient.

2. Perfect asepsis of operator, assistant, patient, instruments and operating room—as called for by modern aseptic surgery.

3. A preliminary study and treatment of the eyes, sufficient to determine the exact degree of strabismus, the motility of the eye muscles, the elasticity of the opposing tissues, the kind and degree of ametropia, and the effects of its correction upon the strabismus.

4. A deliberate planning of the tenotomy, so as to best correct the mechanical elements known to aid in producing or continuing the squint—the lack of power in the opposing muscles, and the elasticity of the tissues.

5. Such selection of instruments as will enable the operator to do the tenotomy, with the smallest opening in the conjunctiva and tendonous sheath, and to divide the tendon subconjunctivally, close to its sclerotic insertion. Clumsy, weak, badly shaped instruments render impossible a clean, nice operation, and are always sources of danger—all perforations of the eyeball during a tenotomy, being traced to their use.

6. Cocaine anæsthesia to be employed in all cases, except the very rare ones, in which individual idiosyncracy necessitates a general anæsthetic.

7. In operating, a small horizontal opening is made with the scissors, in the conjunctiva and tendon sheath, directly over

the center of the tendonous insertion; then a vertical opening into the tendon at its insertion; the remaining halves being divided, separately, to their outermost extremities, by successive clips of the scissors. This method of operating least disturbs the lateral position of the tendon, as it slips back, to its new attachment, and preserves intact all connections of the tendon, which the operator does not desire to sever.

8: Double tenotomy is chosen, in preference to a single one with extensive severing of the muscular attachments. But, if this be insufficient, the attachments of the muscles may be divided, as is needed to produce the desired effect. If still the operator fails to secure the desired result, he may employ sutures to increase it. These should always be fastened to the superficial fibres of the sclerotic, and be attached to the commissure. In case of double tenotomy of the external, the sutures from either eye may be tied over the bridge of the nose, thus bringing the eyes into such a position as may be needed during their re-attachment. Advancement of the weaker muscles is generally preferable to the use of such sutures. I have found that slight degrees of deviation, can be corrected very satisfactorily by the use of Gould's method, applied immediately after the operation. This aids in securing binocular vision, also.

9. If the immediate result of a tenotomy be too great, it is corrected by a conjunctival suture over the site of the tenotomy.

10. In tenotomy of the internal, the operator aims to leave a slight convergence, and a motility such that when the eyes are fixed upon the object at seven inches, they will not diverge; in tenotomy of the external, there should be slight convergence; in tenotomy of the superior or inferior recti, there should be slight under correction at the first tenotomy, reserving for a second a finer adjustment of the optical axes.

11. When considerable sight remains in the squinting eye, binocular vision should be sought; and in securing this, the use

of prisms affords an invaluable guide, both for operation and for estimating the results of a tenotomy.

12. No after-dressing is called for, but the eye should be protected from wind and dust by a shade, until the effects of the cocaine have passed away. The healing process is promoted, and the comfort of the patient increased, by the frequent soaking of the eye in hot water.

13. Practically, there are no dangers connected with an ocular tenotomy, provided the operation be done aseptically, the scissors used be sharp, blunt pointed, and able to cut cleanly to their ends, the light good, the operator in good working condition, with a distinct idea of each step of the operation, on the special case before him, and the wound be protected from infection and unfavorable conditions.

THE SLIGHT EFFECT SOMETIMES OBTAINED AS THE RESULT OF FREE TENOTOMIES OF THE OCULAR MUSCLES.

By DR. THEOBALD, of Baltimore.

He believed it to be a generally recognized observation, that in tenotomies of the ocular muscles a given amount of cutting is not always followed by the same amount of correction. Why this should be the case we do not, as yet, fully understand. As a general principle, the effect of a tenotomy depends upon the extent to which the attachment of the muscle is set back, the greater the recession, the more marked the effect, and *vice versa*. Hence, when a decided effect is wanted, we divide not only the tendons, but Tenon's capsule more or less freely, and when only a slight effect, we limit our section to the muscle. To this extent we can control our results; but, the fact remains that in different individuals, exactly similar operations not infrequently yield markedly different results. While we do not fully understand the reason of this, we are, at least, not wholly in the dark as to the matter. As a rule, the effect of a tenotomy upon a large, prominent eye will be more marked than one upon a small, deep set eye. Hence we may anticipate a greater effect from an operation upon a myopic, than from one upon a hypermetropic eye. The size of the muscle operated upon was also thought to influence the result; the effect being less in proportion, as the muscle is strong and well developed. The thickness and strength of Tenon's capsule may also have an effect. In some individuals, the muscle, when separated from the sclerotic, has a more marked tendency to retract towards its orbital attachment, which would, of course, increase the effect of an operation upon it. His experience inclined him to the belief that tenotomies done for heterophoria yield, as a rule, less marked results than those done for strabismus. The striking instances of slight effect from free tenotomies, which he had met, all occurred in operations upon the internal recti for esophoria. Two cases only were related, though others almost as striking had been met with. In one of these, a school girl of sixteen, a free tenotomy of each internal rectus was done without producing an appreciable effect upon a previously existing esophoria of 9° to 11°. In the other, an artist aged 26, a free tenotomy upon each internus, such as would have sufficed in many cases for the correction of a decided strabismus, diminished the pre-existing esophoria by scarcely 2°.

THE LIMITATIONS OF TENOTOMY OF THE EYE MUSCLES.

By HOWARD F. HANSELL, M. D., Philadelphia, Pa.

Esotropia. In alternating squint when prolonged paralysis of the accommodation, followed by full correction of H. worn for a sufficiently long time, has proven inefficacious, tenotomy of each internal rectus, dividing the operation equally between the two muscles, and without advancement of either external, is the proper surgical proceeding.

In constant monocular squint, tenotomy of either or both internal muscles is unavailing without advancement of the external of the squinting eye. In addition section of the superior of the same eye is often necessary.

Exotropia. Adduction must be raised to the normal standard by tonics and surgery. We have an apparent choice of three operations—tenotomy, advancement, or a combination of both. Tenotomy alone is useless. Correction of the M. which is frequently associated with exophoria, prism exercise and advancement of interni are recommended.

Hypertropia. In concomitant squint hypertropia needs no treatment; in constant squint tenotomy of the superior rectus is often necessary.

Heterophoria. A very large proportion of the cases depend upon an error of refraction and needs no treatment other than removal of the cause.

Esophoria. A course of atropia, wearing as near as possible full correction, will in most cases remove the necessity for operation. When the latter is unavoidable, tenotomy, which must in some cases be repeated, is indicated. Advancement of one, or both externi may be necessary to complete the cure.

Exophoria. Tenotomy is powerless to effect more than a temporary cure. Advancement of the interni should always be preferred either alone or in combination with tenotomy when the greatest possible effect is demanded.

Hyperphoria. Seldom demands operation notwithstanding the extraordinary claims made by enthusiasts. Partial or complete tenotomy is to be performed only when full correction of the error of refraction fails.

TENDON ADVANCEMENT AND TENDON RETROPLACEMENT.

By CHARLES HERMAN THOMAS, M. D., Philadelphia, Pa.

Reference is made to advancement of tendons as distinguished from tendon resection, or tendon shortening. Tendon advancement may be required as a remedy for strabismus, insufficiencies and for results of old operations excessive in their effect. Tendon retroplacement is recommended as a control procedure in connection with tenotomy, and is to be practiced at the time, and as a part of the original operation.

In the writer's opinion, the operation for tendon advancement, as described by Stevens, may be substituted with advantage, for all other operations hitherto described. In a single particular, only, has any modification of Stevens' method seemed advantageous, and that relates to the location of the stitch making the attachment to the globe. The conjunctival stitch which he recommends, having occasionally failed, the author has come to rely on a sclerotic attachment, not involving the conjunctiva. It is to be expected that the result obtained at the time of the operation will closely approximate the result finally reached. The author has frequently found a difference under these circumstances of not more than 2°.

Tendon retroplacement is applicable as a control procedure in tenotomy where accurate dosage is essential. In such cases, it not infrequently happens that section of a tendon less than complete severance, fails to produce a sufficient result, while a complete severance produces an excess. Under such conditions the correction is to be made quantitatively exact by first making the complete section and then at once advancing the tendon to the proper point—back of its original insertion.

This operation differs radically from that often recommended, in that it discards the large conjunctival wound and the conjunctival suture.

THE INDICATIONS FOR, AND THE ADVANTAGES AND TECHNIQUE OF, MUSCLE SHORTENING.

By G. C. SAVAGE, M.D., Nashville, Tenn.

In this paper the doctor taught that muscle shortening was indicated in all cases of heterotropia regardless of the direction or extent of the turning. He stated that shortening alone would, in many cases, effect a complete cure of the squint, while in many other cases the shortening should be associated with a partial tenotomy of the stronger muscle. In all cases of heterophoria not cured by a partial tenotomy done but one time on any one muscle, the remainder should be corrected by shortening the weaker muscle or by rhythmic exercise when possible. He taught that the only operation indicated in exophoria with less than 8° of abduction power is the shortening operation. He likewise taught that the low degrees of esophoria should be treated by a shortening of the external recti alone. In hyperphoria not reduced to 2° or less by a partial tenotomy of the superior rectus of the hyperphoric eye, he taught that the inferior rectus of the same eye should be shortened. In speaking of the indications, he concluded by stating that in all cases where shortening was indicated, except in hypertropia and hyperphoria, the operative effect should be equally divided between the corresponding muscles of the two eyes; that the superior and inferior recti of the cataphoric eye should be operated on rarely, if ever; that since partial tenotomies and shortenings can effect so much, a complete tenotomy of an ocular muscle cannot be often indicated. The advantages he claims for shortening a muscle over an advancement, as formerly practiced, consists of the great ease with which the former operation is done, and the great comparative freedom from danger of effecting any torsion of the eye, which is so likely to occur in an advancement; and if the knots hould become untied in the shortening operation the patient's condition would not be worse after than before, which cannot always be said when the same accident happens in a case of advancement. The kunckle formed by the folding soon disappears by absorption. In speaking of the technique of muscle shortening, he gave his method of operating, which he practiced some time after he introduced the operation. At the suggestion of Dr. Tenney, of Boston, he has adopted a modification which makes the operation much easier, without lessening at all its effectiveness. This modification consists of making a horizontal cut through conjunctiva and capsule of Tenon at the lower border of the muscle, from its tendon insertion back as far as the operator may deem necessary. Through this horizontal slit two strabismus hooks are passed, one beneath the tendon at its insertion, and the other at the posterior extremity of the incision, beneath the muscle. By means of these hooks the muscle is elevated, when a needle armed with one thread is made to penetrate the conjunctiva, the capsule and the tendon at its insertion and nearer the upper border. The needle is then carried back beneath the muscle, and parallel with the horizontal meridian of the eye, until the point is reached through which the operator desires to have the needle make its exit, when it is brought through the muscle, capsule and conjunctiva. The posterior hook is now withdrawn from beneath the muscle and is passed between the conjunctiva and capsule, and the needle is made to re-enter the opening just made in the conjunctiva, and is brought out through the horizontal cut beneath the muscle, between the conjunctiva and capsule. The lower border of the muscle is now raised by the hook or fixation forceps, and the needle is made to penetrate the capsule and muscle without in, and is again brought out through the cut in the capsule. This leaves a loop of thread over the capsule and muscle and beneath the conjunctiva. The needle is now passed beneath the tendon at its insertion, and is made to penetrate it within out, nearer its lower border, and is brought out through the conjunctiva at a point in line with the first puncture, and about one-eighth of an inch distant. The needle is now removed and the surgeon's knot is tied, by means of which that part of the muscle beneath the loop is brought forward in contact with the inner part of the tendon at its insertion. The suture is allowed to remain from four to six days, when adhesive inflammation has fixed the muscle in its new relation. The author of the paper believes that the suture plates recently invented will be of great service in performing this operation.

DISCUSSION.

DR. STEVENS, New York: On the subjects of the papers which have just been read there remain, therefore, for discussion, these two questions:

1st. "*Why are slight effects produced as the result of free tenotomies of the ocular muscles?*" and

2d. "*What are the indications and advantages for muscle shortening?*"

In regard to the first question, the slight effects sometimes resulting from free tenotomies, I shall venture the assertion that a tenotomy uniformly produces all the effect which we have a right to expect from it. If we hope to produce a definite effect by operating on a muscle which is not the chief element in the condition for which we operate, we may expect disappointment. In other words, we shall not get the effect for which we hope if we operate on the wrong muscle.

It is necessary always to take into consideration all the reasons, all the conditions, which enter into the anomaly for which the operation is to be done. All cases of esophoria, for example, do not of necessity depend upon any anomalous relations of the external and internal recti muscles. We may have, and indeed we do have, many cases of deviation or of deviating tendency of the visual lines inward which depend, not upon a false relation of the lateral muscles, but upon too great tension of the vertically acting muscles. In such a case one might almost remove the internal recti and still have to deal with a condition of esophoria As to exophoria, I suspect that, as an essential and original condition, it is of much less frequent occurrence than is generally supposed. Indeed, to an important but not to the full extent, I may express my present view on this subject by repeating what I said in a paper on exophoria in 1889 (*Archives of Ophthalmology*, XVIII., 4, 373), and in which I called attention to the fact that free tenotomies of the externi often produce less pronounced effects than might be supposed. I then gave as a reason "*That exophoria is not infrequently the expression of hyperphoria, is a fact that cannot escape the notice of the careful observer.*"

In the same paper a thought which had more strongly impressed itself upon my mind than I was then ready to fully express was stated as follows:

"When the relative physiological power of the externi and interni are considered, we may well question whether exophoria is often a congenital defect." I did not then think that the available facts warranted any assertion, nor am I at present ready absolutely to exclude exophoria from congenital anomalies, but I feel warranted in saying that it is in every case safe to assume that it is an acquired condition, although careful consideration may at length lead us to adopt the view that a given case is an original and essential anomaly.*

I have shown in papers which have been published from time to time, during several years, how converging strabismus may often be relieved by proper relaxations of the overacting superior or inferior recti, and one who gives the subject careful study will be surprised to find how large a number of squinting people squint in or out, not because of an excessive, or of an insufficient, normal tension of the lateral muscles.

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*In a case just now under observation, and which is not unlike a large class of cases of exophoria, there exists exotropia of 12°, while the tropometre shows the nasal rotations of both eyes to be quite in excess of the temporal rotations. To one who has carefully observed how even moderate tenotomies of the externi restrict the rotations outward, this condition is extremely suggestive.

I present here the photographs of two patients, each with marked converging strabismus; also a photograph of each of these patients in which it is plain to see that, whatever other anomalous condition may exist, or whether the best or the worst way has been adopted, neither of which questions is raised in this connection, a notable change has occurred in regard to the converging squint. In fact, it has been abolished; and yet in neither of these cases has there been the slightest interference with the lateral muscles, but in each case there has been a relaxation of both superior recti (see *Annales d'Oculistique*, June, 1894, p. 392).

Now, let us suppose that in either of these cases a tenotomy of the internus had been done (as had been strongly urged by distinguished surgeons in both cases), is it not plain that a positive injury would have been done? But is it not also plain, and this is the bearing of these cases upon this question of free tenotomies and small results, that if these eyes were caused to swing in by virtue of the action of the vertically acting muscles no tenotomy of an internus short of turning the balance of the eyes distinctly outward would have served to prevent the inward squint? After such a so-called "correction," comes, very naturally, the gradual divergence so often seen after squint operations.

But there is in all this an element of great importance which has been generally overlooked, although I have called attention to it more than once. This free tenotomy of a lateral muscle which may cause so little apparent change in the appearance of the eyes when directed straight forward will cause a marked, and generally an unfortunate, disability of the eye to rotate in the direction of the free tenotomy.

Time in this discussion will not permit me to go into detail in regard to these conditions, but I may, in a few words, call your attention to some important truths.

An unfavorable direction of the eyes with regard to the horizontal plane, in which, by virtue of a preponderating action of the upward or of the downward drawing muscles of one or of both eyes equally or unequally, an excessive effort is demanded on the part of the opposing muscles, predisposes to a drifting in or out of the visual lines, according to circumstances. If the disproportionate tension of the vertically acting muscles is exactly equal, esophoria or esotropia usually results. If there is excessive and unequal vertical tension, exophoria or exotropia often results.

This being the case, it becomes a matter of the first importance that we determine not only the absolute but comparative rotations of the eyes, not only from side to side, but up and down.

We have had, until quite recently, no sufficient means for determining these rotations. The judgment which we may form by watching the rotations, is not to be relied upon. The perimeter is destitute of any considerable value for this purpose. By it we cannot measure the downward rotation in many cases, for the pupil buries itself behind the lower lid; nor can it measure the rotation inward, for the nose interferes, and even the outward, the only one which can be generally measured, is not well measured.

The instrument which I show you here, and which I have called a *tropometre*, serves, in this respect, a valuable purpose.

It consists essentially of a telescope, in which the inverted image of the examined eye is found at the eye-piece, where, either as an aerial image or as an image upon a ground glass, its movements can be accurately observed. A graduated scale in the eye-piece permits every movement of rotation in every direction to be exactly measured. For the purpose of convenience in being near the patient, and of presenting no obstruction to the light which should fall upon the examined eye, a right-angled prism or an obliquely placed mirror is adjusted at the distant end of the telescope, permitting the examination from the side instead of from the front.

Now, if we study the vertical actions of the eye muscles in connection with the lateral, we shall find that we have rarely—indeed, I think I shall not be betrayed into exaggeration if I say that we have *never*—to make very free tenotomies in any direction, for even in cases of extreme squint inward or outward, when we have accomplished the first stage of correction, which should be that of establishing equal and proper rotations up and down, there will remain so little to do that a complete tenotomy of an internal or an external rectus muscle can never be required. In short, if we attend to *all* the elements which enter into the production of a lateral squint, instead of directing our attention exclusively to one muscle, and that generally the wrong one, we shall never have occasion for great operations.

Now let us turn our attention to the question of indications and advantages of tendon advancement.

The question turns first upon the purpose for which the operation is to be done. If it is for the purpose only of "straightening a cross eye," which is the purpose so often, then I have no interest in its discussion. It makes little difference how it is done. It is a subject belonging neither to science nor to high art.

But if it is done with the definite and intelligent purpose of establishing binocular vision at *all normal points and under all normal circumstances*, we have a question of the highest scientific value, and calling into service some most delicate and beautiful principles.

Many years ago I advised, when there appeared a necessity of making a very free tenotomy, to divide the effect between a moderate contraction of one muscle and a moderate tenotomy of its opponent, doing each upon both eyes, thus leaving the tension of the two opposing muscles as nearly as possible equal in sum to the original tension, but with the amount so divided as to bring about the desired effect.

Superficially, this appeared to be good logic and sound practice. As a matter of fact, it was neither the one nor the other.

We must recur to the principles which I have already discussed in regard to tenotomies. We must first ascertain exactly why an eye deviates in this or in that direction; and then, if surgical operations are required, we should inquire whether the tensions are too great or too small. And, exactly here, upon the answer to this question, should the selection of a method be determined. How are we to know? Does the fact that, for example, in converging strabismus the eye appears too far in, tell us what to do?

I know of but one method of solving the question absolutely We may do this by the tropometre.

Let us, for illustration, assume that the temporal rotation should normally be 45°, and the nasal 50°, of arc. This would give us the sum of a normal rotation in the lateral directions of about 95°. Then, suppose that the upward rotation should be 45°, and the downward rotation 50°, the sum would be 95° again. Now, should we find in a given case that the sum of these rotations should largely exceed the amounts given, it would be an indication for tendon shortening. I have found the percentage of these cases very small. The eyes of such people are usually, if not always, very prominent—almost goggled. The movements can be seen to expose large tracts of conjunctiva, and the eyes swing in or out according to the conditions of fixation.

By far the greatest number of those who have lateral deviations show no such excess of rotations. They are, in the great majority, restricted to $\frac{3}{4}$ or even $\frac{2}{3}$ of the normal rotations. To tie up such muscles and to increase the already excessive tension may be to improve the appearance of a patient; it certainly adds nothing in a rational way to an actual correction of the disabilities of rotation. I do not deny that eyes may be brought into closer relations in certain directions by such forcing, but I greatly question the wisdom of the method.

We may, then, sum up an answer to the questions which have been presented in a few words.

Free tenotomies have slight apparent effect when the muscle operated on is not the muscle at fault, and tendon contractions are advantageous only when they are directed against a condition of muscles positively shown to be loose, not by the failure of the eye to rotate in a single direction, but by a marked excess in the sum of rotations in opposite directions.

To draw a useful lesson from these few suggestions, I would say that a case of strabismus convergens or divergens is to be studied from the standpoint of the tensions of all the eye muscles, and that a very large proportion of these, and especially those of high degree, are the manifestations principally of vertical tensions.

If the rotation upward of the eyes, as shown by the tropometre, is materially less than 40°, while the downward rotation materially exceeds 50° or 55°, no correction for the lateral deviation should be made until the rotation upward equals 40° or more, and hyperphoria is absent. Or if the upward rotation is excessive in comparison to the downward, an analogous correction is first to be made before an internal or an external rectus is cut.

If the rotations in all directions are evidently too great, indicating an absence of proper muscular tension, tendon shortening may be resorted to, which will be very rarely. If the sum of the rotations is not excessive, tenotomies only are called for.

Dr. S. D. Risley, Philadelphia, Pa.: I will speak only as to the excellent paper of Dr. Theobald. I feel that while Dr. Stevens is correct in the views expressed in some cases, there is a large group in which the cause is the existence of some general discrasia, impairment of innervation, or some congenital defect in the muscle itself, or in its origin or attachment. Many instances of abnormality of ocular balance I regard as probably due to anomalous forms in the skull or orbit. These factors should all be considered before essaying any tenotomy of an ocular muscle.

DR. A. J. ERWIN, Mansfield, Ohio: Will Dr. Savage please state in his closing remarks the degree of permanent success of his operation for shortening of the recti. Has the correction lasted or has the muscle in time relaxed again?

DR. SAMUEL THEOBALD, Baltimore, Md.: Dr. Connor attaches great importance to antiseptic precautions in operating upon ocular muscles. For more than twenty-five years I have operated absolutely without such precautions, and have never had any suppurative or other inflammatory trouble. I would ask if any member of this section has ever seen infected inflammation after a tenotomy? If not, I think antiseptic precautions in such operations may be regarded as a work of supererogation. Dr. Conner attaches much value to the test of the abducting and adducting power as a guide to tenotomies. Many years ago, I declared my conviction that the overcoming of prisms was a matter of "knack," which some had and others might acquire; and that it really gave you no trustworthy indication of the muscular balance. I have met with cases where the vertical diplopia tests (which I regard as the most trustworthy indication of the muscular balance), showed marked exophoria and yet, where the adductive power seemed to indicate unusual strength of the interni. Dr. Stevens has offered as an explanation of the effect which sometimes follows free tenotomies, that the wrong muscle might have been divided, and thinks that would explain the result. I think that exactly the opposite effect would be produced if the wrong muscle were divided—that is, an over-correction would result, instead of the slight effect which I have reported. Dr. Hansell has spoken of sinking of the caruncle as a necessary result of tenotomy of the interni. This has not been my experience. For many years I have been in the habit of dissecting freely the conjunctiva from the underlying tissue over the region of the muscle to be divided, and this, in my hand, has entirely prevented sinking of the caruncle, even in the most generous tenotomies. Dr. Risley has suggested that excessive weakening of the externi, as shown by very low abductive power might explain the slight effects which I have reported from free tenotomies. In one of my cases, at least, this explanation would not apply, as there was eight degrees of abduction at twenty feet.

Dr. Herman Knapp, New York: I have seen in my own practice, two cases of suppuration in the wound after sub-conjunctival tenotomies. The one led to excessive strabismus, which years afterwards was completely rectified by advancement: the other was a minor case. One eye I operated on was lost by diphtheretic affection of the wound extending to the conjunctiva. The child, apparently healthy at the time of the operation, developed a severe scarlatina with diphtheria a few days after the operation. In one case of mine, published in the Festschrift to Helmholtz' 70th Birthday, tuberculosis of the conjunctiva followed a subconjunctival tenotomy in a girl of tuberculous habit. The existence of the tuberculous nature of the affection was proved microscopically and experimentally in inoculation.

Dr. F. C. Hotz, Chicago, Ill.: Six years ago I saw a case where the tenotomy of the internus was followed by suppurative inflammation, and ended in the destruction of the globe. The operation was performed by another surgeon, who called me in for consultation, and whose statements left no doubt of the direct connection between the operation and the suppurative inflammation. And, anyhow, as long as we accept the doctrine, that suppuration after an operation is caused by infection, and as long as we insist on strictly aseptic precautions in the major operations, I see no logic in the practice of neglecting these precautions in minor operations, only because, usually, no serious accidents occur after them; but that they may occur, has been demonstrated to me by a case that occurred in the early days of my practice. We all, I am sure, consider the removal of a tarsal tumor a very slight operation, and do not expect to see any serious trouble coming from it; but twenty years ago I saw a virulent suppuration start in the lid from which I had removed a small chalazion. The suppuration spread, involving the tissues of the orbit, and ultimately invaded the globe and destroyed it by panophthalmitis.

Dr. C. Herman Thomas, Philadelphia, Pa.: I can only say, with Dr. Theobald, that though operating for many years upon these muscle cases, I have never seen a single suppurative case, and can only recall a case in which any inflammation followed the operation, that being only an episcleritis. I have adopted no formal antiseptic precautions, but only practiced ordinary cleanliness. As regards Dr. Savage's paper, I am surprised that so elaborate an operation as this should be proposed when we have the simple and effective Stevens operation.

Dr. G. Edgar Dean, Scranton, Pa.: Prior to my adoption of antiseptic procedure I had a case of advancement of the external rectus in which suppuration occurred with the production of an abscess. The effect of the operation was nullified by the abscess, but the patient was left in no worse condition than before the operation. Since resorting to aseptic operations, I have had no suppuration resulting.

Dr. Frank Allport, Minneapolis, Minn.: Four years ago, I operated for tenotomy under strict antiseptic precautions. Notwithstanding such procedure, an abscess formed at the seat of operation, which subsided, leaving a tendon sloughing and necessitating an advancement of the opposite muscle. If such an accident can occur under proper antisepsis, certainly it is more than possible with simple cleanliness. In short, all operations, certainly those of the globe, should be performed under the best conditions. We cannot afford to take chances. With regard to Dr. Savage's operation for advancement I have only to say that for some years I have satisfactorily used the single suture method of Beard, of Chicago, described in the last *American Journal of Ophthalmology.* It is simple, easy, and satisfactory.

Dr. Leartus Connor, Detroit, Mich.: I was led to insist upon careful aseptic precaution in ocular tenotomy because, first, I found credibly reported, many cases of suppurative inflammation following septic infection. If this be true of the few reported cases it is fair to infer that other cases exist among the thousands of unreported tenotomies. Modern surgery demonstrates better results in every case where the most aseptic precautions are taken, hence there is every reason to insist upon full aseptic care in every tenotomy.

Dr. G. C. Savage, Nashville, Tenn.: First, allow me to defend my word "Cataphoria" as against the word "Hypophoria." Certainly the meaning of the former is just as clear as that of the latter, and there is not the danger of confusing it, in either speaking or writing, with "Hyperphoria."

As to the modification of the operation of muscle-shortening suggested by Dr. Hansell, in his paper, I can only say that it is an unnecessary traumatism, since in all cases the kunkle of muscle is soon absorbed. As to Dr. Theobald's case, in which he got slight effect from an extensive partial tenotomy of the internal rectus, I will say, that no doubt, in some cases, the cause of this is as stated by Dr. Stevens; in others, the cause may be as suggested by Dr. Risley; but in many other cases, I believe there is still another cause. (Just here, allow me to put to rest the mind of my friend Hotz, by stating that I do not believe that this cause resides in the oblique muscles.) To make myself clear, Dr. Theobald will allow me to criticise him just a little, touching his cases reported. The result shows that the Doctor not only operated on the wrong muscle, but he also performed the wrong operation. The case, it is true, was esophoric, but the interni were too strong only in comparison with very weak externi. They were not intrinsically too strong. This might have been determined by testing the adduction. I am certain that he would have found this less than 45°, and if so, instead of dividing the tendon of the internus, he should have shortened the externus muscle, when he would have gotten the desired result. In esophoria, the adduction test should always be resorted to, so that we may determine whether to do a partial tenotomy of the internus or a shortening of the externus. If the adduction is above 45°, and the condition is not pseudo-esophoria, then the tendons of the interni should be cut more or less extensively; if less than 45° of adduction is found, however great the esophoria may be, the externi should be shortened. In cases of esophoria, the abduction test is useless. On the contrary, if there is exophoria, the abduction should always be resorted to, and if it be above 8°, a partial tenotomy of the externi would be justifiable; but if below 8°, and an operation is decided to be necessary, it must be a shortening or advancement of the interni. The adduction test in these cases is worthless. Before any operation is done on any rectus muscle, the conditions of the vertical muscles should be determined by both the equilibrium and strength tests.

In answer to Dr. Erwin, I will say that the proper selection of cases is most essential to success in these operations; but, of course, the greatest care must be exercised in doing the operation that may be indicated. These rules followed, the success of operations on the eye muscles will compare most favorably with any other class of surgical work.

Dr. Geo. T. Stevens, New York: Some of the gentlemen have used such terms as "weakness," "loss of innervation," etc. I do not like these expressions, as they have no definite meaning. We do not use them in speaking of other parts of the body—legs, arms, etc.—so let us drop the use of such terms until we have a definition for them.

THE EXTENT TO WHICH EXERCISES SHOULD REPLACE TENOTOMY IN THE TREATMENT OF HETEROPHORIA.

By DR. HIRAM WOODS, Baltimore, Md.

Gould's "prism handicap," and Savage's "rhythmic exercise," were considered. It was held that distance balance test was a part of the diagnosis. It should be compared with associated refraction error, and near balance test. In hyperphoria, supra- and infra-duction should be taken, and in es-, or exophoria, abduction. Adduction, the writer thought, was an expression of positive relative convergence rather than an indication of the real contractile power of the interni. It was possible by Gould's method to double or triple it in a few minutes. Cases were narrated to show that inability to divorce C. from A. could cause asthenopia, and were curable by Gould's method.

The following conclusions were drawn:

(1) Gould's method will almost certainly give relief in the considerable class of cases where exophoria and low adduction exist without high abduction.

(2) When exophoria is associated with high abduction. adduction should be developed by Gould's method, and the case watched for a time before operating. This is to determine whether it is excessive externus action or defective relative convergence that is causing asthenopia. The writer had not found Gould's method useful in any form of heterophoria except exophoria.

It is thought that Savage's rhythmic exercise should displace tenotomy in the treatment of low hyperphoria when supra- and infra-duction are not over 1 or 1½ degrees apart. Again, it is useful in the comparatively rare class of cases where all the muscles seem wanting in contractile power, irrespective of muscular balance; and, thirdly, when a weak externus, with abductive power of 3° to 4°—(5° being considered the minimum of normal abduction)—seems the cause of asthenopia, and operation seems inapplicable. This is the class of cases that usually get relief from weak adducting prisms.

PRACTICAL POINTS GAINED IN THE TREATMENT OF ONE THOUSAND CASES OF INSUFFICIENCIES OF THE OCULAR MUSCLES.

By J. WALTER PARK, M.D., Harrisburg, Pa

Late Clinical Assistant Royal London Ophthalmic Hospital; Ophthalmic Surgeon, Harrisburgh Hospital; Children's Industrial Home; Home of the Friendless, and Cumberland Valley Traction Co., Harrisburgh, Pa.

Of all my cases I find about 75% of them insufficiencies of the external recti, 25% of the internal, and but ⅔ of 1% of all the other ocular muscles. Insufficiencies of the external recti were most frequent in low degrees of hypermetropia and hypermetropic astigmatism, averaging about 70%, and about 30% of the interni. Insufficiencies of the interni and externi in myopia and myopic astigmatism occurs in about 6% of all the cases. I will consider the management and treatment of these cases under the following classifications: 1st. Those occurring in hyperopia and compound hyperopic astigmatism. 2nd. Those occurring from constitutional, paralytic and reflex causes. Under the first classification the majority occurred in cases ranging from a +.25 astigmatic to a +.75 either hyperopic or compound hyperopic cases. The degree of deviation ranging from ½ to 3 degrees in the majority of cases. The insufficiences occurring in refractive errors from +.75 D to +6 D. generally range from 3 to 20 degrees of deviation. The majority of cases occurring in the lower refractive errors, ranging from ½ to 3 degrees, were no doubt due to spasm of the ocular muscles, and were generally relieved by correcting the error of refraction and proper outdoor exercise; and in those cases which I did use prisms, it was generally for a few weeks at the longest, when they would finally be more comfortable without them. I am now speaking of average results. I wish to impress the fact that I obtained good results in most cases of moderate degrees of insufficiencies by correcting the errors of refraction, and the advice of complete rest of the eyes for close work for some time, outdoor exercises; and general strychnia and the triple valerianate pills, three times a day, did very well in many muscular insufficiences varying from ½ to 3 degrees. Exercising with prisms has met with but partial success in my practice. I find that the majority of patients will not follow out one's instructions at home properly, and to come regularly to the office to have it done incurs an expense which most of them will not do. The following exercise, in a great many cases, gives me just as good results, and will be carried out much more effectually and with less expense to the patient. I instruct them to spend a fourth hour twice a day sitting in an erect position and fix the eye or eyes at a point either to the extreme right or left, on a horizontal plane, and at right angles to the body keeping them fixed in that position for a minute or two if possible, and then repeating the experiment regularly. Tell your patient to always sit in the same position, looking at the same object, and move the eyes in a similar manner, and you will generally have the same muscular effect upon the ocular muscles, as exercise does upon any other muscles of the body. When this is done regularly for two or three weeks, you will generally have gained from 5 to 10 degrees in convergence or a few degrees in divergence, according to the muscle exercised. I think the tendency toward performing tenotomies for every insufficiency of a few degrees is lessening, and instead we will urge more rest and outdoor exercise, and such hygienic instructions as will improve the general health. 3rd. Those occurring in myopia or compound myopic astigmatism. Muscular insufficiences in myopia, in the majority of cases, involve the internal recti causing a divergence from ½ to 30 degrees, the average ranging from 10 to 15 degrees. My experience in the correction of these muscular insufficiencies has not been so satisfactory with rest and outdoor exercise as those occurring in hyperopic cases. I have been obliged to prescribe more prisms for continuous use in myopic insufficiencies than in hyperopic ones. The majority of cases with an outward deviation of from 10 to 15 degrees will feel comfortable with a prism correcting about half their error, for constant use. Few in my experience can stand even ⅔ of a full correction and wear them constantly, but in esophoria the majority of cases felt more comfortable with a full correction. I have only performed tenotomies in myopic insufficiencies in cases of from 15 to 25 degrees of deviation, and have generally had good results with prismatic corrections in those under fifteen degrees. My results from tenotomies, combined with advancements, were generally good in about 30% of those cases that I was enabled to follow up, which was from six months to two years afterwards. A summary of my views upon insufficiencies of the ocular muscles is as follows:

1st. That following up one's cases for one to two years is necessary, and should be done in all muscular insufficiencies to tabulate results for publication. 2nd. Those cases involving the recti muscles, occurring in hyperopic and compound hyperopic astigmatism of from ½ to 15 degrees, combined with errors of refraction, will generally all do well with their refractive errors corrected, muscular exercises, outdoor life, tonic treatment and the temporary use of prisms. 3rd. Those occurring in myopia and compound myopic astigmatism require the use of prisms more constantly, and are not benefited quite as much by muscle exercising as those occurring in hyperopia, etc. Tenotomies with advancements are generally more effective than in hyperopic cases. 4th. Those occurring from constitutional, paralytic and reflex causes, require plenty of rest, outdoor exercising, the temporary use of prisms, electricity and the general tonic treatment. 5th. Tenotomies are not necessary in most cases, and should not be done until all other remedies fail. 6th. That there are some cases of esophoria of slight degrees of deviation, that require nothing but rest and outdoor exercise to effect a cure.

SUPERIOR RECTUS MUSCLE.

By DR. EDWARD J. BERNSTEIN, Baltimore, Md.

He read a paper on this subject in which, after calling attention to the anatomical relations and the physiological function, he records three simple and uncomplicated cases of paralysis of the superior rectus.

The gist of the paper lies in these facts, that the superior is only a pure elevator of the eye when there is abduction of 23 degrees, otherwise its function is that of elevation, slight adduction, and vertical rotation of the corneal axis toward the nose. Its antagonist is not the inferior, but the inferior oblique muscle. That when medical treatment proves futile after the lapse of sufficient time, surgical treatment is indicated, but of all things, not tenotomy of the inferior rectus, but either advancement of the paretic muscle or tenotomy of its fellow in the other eye. Sometimes Dr. DeWecker's capsular advancement will suffice. As to the etiology, it is claimed that in addition to anatomical causes, lesion of the twig of the oculo-motorius, supplying this muscle, is also a factor, just as we have lesion of the separate twigs of the recurrent laryngeal.

Dr. Bernstein calls attention to the treatment of hyperphoria, claiming, though he sees it relatively frequently, it is rarely necessary to do more than correct whatever ametropia is present and give tonic treatment. He moreover doubts that the assistance afforded by a quarter degree prism is often needed.

HYSTERICAL INSUFFICIENCY OF CONVERGENCE.

By DR. H. GRADLE, Chicago, Ill.

The author states that he has seen relatively often insufficiency of convergence, sometimes with reduction of accommodation, in hysterical patients complaining of asthenopia or headaches. Examination showed in some cases the complete absence of other ocular anomalies, while in others the correction of existing defects did not reduce materially the patient's discomfort. The insufficiency of convergence was shown by inability to approach an object up to the normal limit (at least four inches) without diplopia, while there was no excess of power on the part of the external recti. The patient, hence, had either no exophoria or only a very insignificant degree of it. The history of the majority proved that the insufficiency of convergence could only be considered as a hysterical paresis.

The author obtained moderate therapeutic success by general hygienic measures, and would recommend careful advancement of the internal recti muscles in the more pronounced cases.

DISCUSSION.

DR. LEARTUS CONNOR, Detroit, Mich.: During the last two months of 1893, and the first two of 1894, I treated fifty cases of exophoria by Gould's method, and have kept track of them to the present. The results are briefly, the relief of the symptoms for which the treatment was undertaken has continued to the present, with one exception, showing a certain permanency. In two cases I noted a correction of five and six degrees of right hyperphoria with nine and ten degrees of exophoria.

The treatment of the exophoria was attended by the disappearance of the hyperphoria. In case of exophoria causing distress in the correction of presbyopia, Gould's treatment afforded speedy and efficient relief. The permanency of the results from Gould's treatment quite equalled that of tenotomies for insufficiency.

DR. G. C. SAVAGE, Nashville, Tenn.: We may have orthophoria far and near, so far as the external and internal recti are concerned, and yet the "balance" thus found may be a "balance" in weakness, as may be shown by low abduction and adduction. Such cases cannot be cured without exercising both these muscles, which can be readily done by means of the double prism arrangement devised by Dr. Geo. H. Price about two years ago. In answer to Dr. Park's statement about muscle operations in the future, I will state that I am willing to stake my reputation as a prophet by now predicting that muscle operations will be done more frequently than in the past. The cases for operation will be better chosen and the operations will be done more perfectly. No one operator may do as great a number as some have done in the past, but a greater number of oculists will be doing them. As to muscle exercise I am willing to concede that the Gould method is better than my own in some cases of exophoria—better because more rapid. All other heterophoric conditions are better treated by "rhythmic exercise."

DR. GEO. H. PRICE, Nashville, Tenn.: I desire to emphasize the reference made by Dr. Savage to a simple device of mine designed to meet the indications in those cases where there is a lowering of the general muscular tone. It is a combination of prisms so arranged, that at the same sitting the patient may with ease and comparative comfort, exercise both the internal and external recti, when these muscles seem to be lowered in their tensile strength. The prisms used are so placed in an ordinary frame that the combination resembles a Franklin divided lens. In the upper half of each cell, is a one degree prism, base in; and in the lower half of each cell, is a two degree prism, base out. The patient using, is directed to look at a light twenty feet distant through the upper prisms for two or three seconds, and then at a dot, or other mark on a card, held in the hand at the ordinary reading distance, for the same length of time, repeating these movements for from five to ten minutes. If this exercise causes any pain at the time, the patient is instructed to shorten the time to one, two or three minutes, and then gradually increase until he or she can use them for a period of ten to twelve minutes, once or twice daily, without inducing pain or discomfort. This form of exercise I have found especially useful in those cases where we have orthophoria, or slight esophoria for distance, and exophoria for near, with abduction say of three to five degrees, and adduction of ten to fifteen degrees, and in which the condition of heterophoralgia is soon brought on by use of the eyes for near work. The strength of these prisms can be increased or decreased according to requirements of individual cases. I have been using this form of exercise for about a year and a half with good results.

Dr. G. S. Hull, Chambersburg, Pa.: I agree with Dr. Savage in saying that muscle-cutting will increase in the future; but think that those who do it, will not be the experts who are at it now, but the novices who are trying to learn something about it. In the days of yore, when we only corrected the ametropia we had a certain number of cases where the heterophoria was not relieved by the best corrections we could give. These cases we benefited more or less by changing their habits and occupations. These same cases now appear, and what do we do with them? Perform tenotomy with the hope of enabling them to continue at their often trying occupations. Do we benefit them much above that obtained by the older methods? A few perhaps we do, but the majority—well, we are beginning to learn of some more doubtful results, even sorrowful ones. Let us study the general health of the patient well before we even think of tenotomy.

Dr. R. A. Reeve, Toronto, Canada: Dr. Gould has referred to the advisability of finding out what he terms diplopic zone. Several years ago Dr. Lippincott and myself called attention at the meeting of the American Ophthalmological Society to a method of muscle-testing we had independently tried, which yielded seemingly useful information. Using the rotary prism diplopia was first induced, and the degree noted; and then at once rerotating until fusion took place, the prism reading was again noted, yielding seemingly the diplopic zone alluded to.

Dr. G. E. Dean, Scranton, Pa.: Referring to Dr. Bernstein's subject, I recall two cases of paralysis of the superior rectus. The first I attributed to the excessive use of tobacco; and it recovered with fair promptness when, after stopping tobacco, I used prisms worn constantly, electricity, and general tonics. After recovery I corrected the moderate refractive error. In the second case the cause seemed to have been mal-adjustment of strong near-sighted glasses. In this case I proposed operation, but the patient rejected it. The annoying diplopia was much ameliorated by putting a strong prism to one eye and decentering the other strong minus lens.

Dr. Hiram Woods, Baltimore, Md.: Regarding Dr. Hull's remarks, I agree that tenotomies in the future among men best qualified to judge of their importance, will be fewer. As our methods of diagnosis improve and the necessity for thorough diagnosis becomes better appreciated, tenotomy will be confined to cases showing a marked preponderance of one muscle over another: in other words, to a muscle where ab-, ad-, supra- or infra-duction is above normal, and in marked excess of its antagonist. I do not believe the majority of cases of heterophoria will show this condition. Dr. Price has shown how the three cases in my paper could have been cured by "rhythmic exercise." That is true, but why take several weeks to accomplish what another method and refraction correction can do in a very short time? Dr. Gould says he does not take the near test—that it is useless as a test for the true balance. It is not useful for this purpose, but for others it is. It bears a relation to the distance test which gives important information about other things. There is an exophoria of two to five degrees in the near, compared to the twenty feet balance which is seen in comfortably working eyes. Dr. Theobald has shown what, for instance, is to be deduced from the presence of a smaller degree of comparative near exorphoria than two degrees. The three cases in my paper point, it seems to me, to the meaning of a certain class of cases where there is an excess of mere exophoria, when abduction at twenty feet has shown there is no excessive strength in the externi, and that exophoria at twenty feet is not due to internal muscular weakness. I believe that distance balance and abduction, refractive error and near balance must be studied together to determine the proper therapeutic measures.

Dr. J. W. Park, Harrisburg, Pa.: I wish to impress upon all the importance of looking after the general health of the patient before deciding to operate. I cannot agree with Dr. Savage, that tenotomies will be done more frequently in the future, but think with Dr. Hull there will be less than at the present time.

Dr. E. J. Bernstein, Baltimore, Md.: I have been inclined to do very little tenotomy for heterophoria, mainly because I felt that I was not sufficiently conversant with all its phases; and while looking up other men's work and waiting for results, I have come to the conclusion that I shall still be very conservative, and trust to other well-known means in a majority of cases.

[This report will be continued in the next issue.—Editor.]

A LETTER FROM DR. HOTZ.

Chicago, September 1, 1895.

My Dear Doctor:

When I read your reply to my criticism of your views on the action of the oblique muscles, I marveled how you came to write the following sentence: "Dr. Hotz's report of this experiment is as strange as fiction, though given as a fact. When the slit occupied the horizontal position, the cylinder, when revolved, inclined the vertical lines without altering the direction of the horizontal lines; when the slit was turned to the vertical position the same cylinder, when revolved, inclined the horizontal lines without changing the direction of the vertical lines."

You are right, this sounds like fiction or nonsense; but it is a most singular and unaccountable misrepresentation of what I published in the *Annals of Ophthalmology and Otology*, and as you did not reprint in the Record my paper, but your reply to it, I ask you to allow me the necessary space in your journal to acquaint your readers with what the experiment referred to actually demonstrated. Its object was to disprove your assertion that in oblique astigmatism the retinal image of a horizontal or vertical line is inclined by a prismatic action of the astigmatic cornea. As a test object I used a bright streak of light furnished by light passing through a very narrow slit in a metal screen; by changing the position of the slit, the light line could be made horizontal or vertical. The light of this line was thrown through a convex sphero-cylinder lens ($10 \overset{\frown}{\smile} 2c$) upon a ground glass screen on which the changes of the image could be plainly observed during the rotation of the cylinder. The observations were described in the following words:

"If this screen is now placed about four inches from the lens, it is in the posterior focal plane; and if the axis of our sphero-cylinder is vertical, we see upon the screen a bright luminous horizontal line. Now, if I turn the axis of the cylinder five degrees to the left (to 95°), the image on the screen is still horizontal but has assumed a long rhomboid figure, its upper and lower line being exactly horizontal, its short sides slanting 5° upwards to the right. If I continue rotating the axis in the same direction you notice the sides of the luminous image become longer and more slanting, while top and bottom become proportionately shorter, but remain horizontal. When the axis of the cylinder arrives at 135°, the figure is a regular rhombus, its sides slanting exactly 45°; and while the axis is traveling from 135° to 180°, the sides grow longer than the top and bottom and gradually turn toward the perpendicular direction; and when the axis arrives at 180°, the image on the screen is a rectangle with well defined sides, but top and bottom blurred. You notice the slanting of the sides of the luminous figure corresponds always exactly with the obliquity of the meridian of greatest refraction, for which the screen is not adjusted; but if we slide the screen a little forward to bring it in the focal plane of the strongest meridian and repeat the rotation of the cylinder axis, you will observe again the same change of the luminous image from a line to a rhombus and finally a rectangle; but you will see now the slanting of the sides follows exactly the axis of the cylinder. But whether the screen stands in the anterior or posterior focal plane you will observe that during all the revolution of the cylinder axis the transverse lines (top and bottom), which of course indicate the position of the image of the horizontal slit, never depart from the horizontal direction.

"And if we turn the screen so as to make the slit a vertical line, we can in the same manner convince ourselves that during all the changes the luminous image undergoes through the rotation of the cylinder from 180° to 90° and back, the sides of the image, which of course determine the position of the image of a vertical object, never depart from the vertical direction. Hence, neither the image of a horizontal, nor that of a vertical, line shows during the rotation of the cylinder any obliquity in the sense of Dr. Savage's theory."

It will be observed, I have expressly pointed out that the change of the image from a horizontal line to a rhomboid figure with oblique sides was caused by diffusion, and that the obliquity of the slanting sides always corresponded with the obliquity of that meridian of the lens, which did not focalize its rays on the glass screen. I thought this explanation was sufficient to make even a tyro in optics understand that the obliquity of these lines was not the result of prismatic deflection. And if you will read my report again, and only bear in mind that when the slit occupied the horizontal position, or in other words, when the test object was only a horizontal line, there were no vertical lines which the cylinder, when revolved, could incline, and when the slit was turned vertically there were no horizontal lines in the test object, the cylinder when revolved could incline, you will, I am sure, marvel yourself how you could make so singular a statement in your reply.

Sincerely yours,

F. C. Hotz.

[By the expression "very narrow slit in a metal screen," it was natural to suppose that it was bounded by four sides, two of them very short, while the other two, for the purpose, were not long. We gladly publish Dr. Hotz's letter correcting the misrepresentation. We take this opportunity to also offer the Doctor space for answering the argument in our reply to his criticism, and to explain why it was that the cameras used by Lowry and Perry acted as shown in the last issue of the Record. —Editor.]

THE OPHTHALMIC RECORD,
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G. C. SAVAGE, M.D., Editor and Publisher.
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Special Week in Ophthalmology in the Philadelphia Polyclinic.

This week of work will commence November 18, '95, and the subjects studied will be "Diseases of the Anterior Segment of the Eyeball, with Special Reference to Diseases of the Cornea, Iris and Ciliary Body."

The first lecture will be on the "Methods of Examination of the Anterior Segment of the Eye," by Dr. Thorington. The second lecture will be on "Ulcerative Diseases of the Cornea, their Etiology and Treatment," by Dr. Jackson. At 8 p. m. of the same day there will be a conference on "Wounds of the Corneo-Scleral Junction, and their Relation to Sympathetic Ophthalmitis."

On the second day there will be four lectures. First: "Anatomy of the Corneo-Scleral Junction, Iris and Ciliary Body," by Dr. Carpenter. Second: "Non-Ulcerative Diseases of the Cornea," by Dr. Schneideman. Third: "Iritis and Cyclitis, their Clinical Varieties, Etiology and Treatment," by Dr. de Schweinitz. Fourth: "Embryology of the Eye," by Dr. Piersol.

On the third day there will be two lectures. First: "The Pathologic Optic Anomalies," by Dr. Randall. Second: "Morbid Growths of the Iris and Ciliary Body," by Dr. Hansell.

On the fourth day, Dr. Risley will speak of "The Nature, Results and Treatment of the Chronic and Secondary Affections of the Anterior Uveal tract and their Relation to Closure of the Filtration Angle—Secondary Glaucoma." Dr. E. W. Stevens will discuss "The Blood Vessels of the Front of the Eyeball and their Relation to Nutrition and Morbid Processes;" and Dr. Veasey will speak of "Episcleritis and its Treatment."

On the fifth day there will a conference on "Phlyctenular Kerato-Conjunctivitis, its Etiology and Treatment."

The sixth day will be devoted wholly to clinics.

There will be numerous clinics held during the week, by the different members of the faculty of the Polyclinic. Some of these clinics will be held in the Will's Eye Hospital, in the Children's Hospital, in the Jefferson Medical College Hospital, in the Philadelphia Hospital and in the Pennsylvania Hospital. The greater number of the clinics, however, will be in the Hospital of the Polyclinic.

Proof-Reading.

At best proof-reading is hard. Even by the most expert proof-readers, mistakes may now and then be over-looked. Anything that helps to make proof-reading more satisfactory is worthy of a trial. As all well know proof must be read from beginning to end in order to see that no words are omitted, which would destroy the sense; also to see that the right words are used in the right places, and that the marks of punctuation are correct and properly placed. Two or three readings are not too many for this purpose. But the most aggravating errors that creep in are errors in spelling, which are likely to be overlooked in the straight-forward reading. These errors can be more easily detected and corrected by over looking the proof from end to beginning, losing sight of the thoughts contained in the paper. Our method of doing this is to glance from right to left and left to right, two lines at a time, thus sweeping the page from bottom to top, looking only for ugly words. If a word is not correctly spelled a single glance at it will impress the mind that there is something wrong. In this way the writer believes that these errors may be more easily detected and corrected than in any other way. If this can be helpful to any one, the writer will be glad.

THE
OPHTHALMIC RECORD.

VOL. V. OCTOBER, 1895. NO. 4.

NEURALGIA PROVOKED BY CARIOUS TEETH COMPLICATING SUBSEQUENT HEALING AFTER CATARACT EXTRACTION.

By L. D. BROSE, M. D., PH.D.
Oculist and Aurist, St. Mary's Hospital, Evansville, Ind.

The importance of enquiry as to the condition of the teeth or the tendency to trigeminal neuralgia, in a patient who is to undergo an operation for cataract, may be the better appreciated by the relation of the following case, where a double extraction of the lenses was made. Jane W., forty-seven years old and unmarried, was brought to me October 15, 1894, by Dr. J. O. Dixon of Tolu, Ky., because of blindness from matured senile cataract in either eye. Patient says her general health has always been good. Vision upon examination was found reduced to the perception of hand-movement just in front of the face. Light projection, tested by reflection with a plane mirror from a lamp burning very low in a darkened room, good in every direction, save in the upper peripheral retinal region where it is not always positive. October 16, 1894, in the patient's private room in St. Mary's Hospital, after three instillations of a few drops of a five per cent. solution of cocaine, and the antiseptic preparation of the eye and conjunctival sac through flushing with a 1 to 5,000 solution of Bichloride of Mercury, the left lens was removed, a small iridectomy being part of the operation. There were no complications, and the eye healed rapidly with the restoration of good vision. October 27, 1894, patient was conveyed upward one story by steam elevator, taken to the operating room, where after the usual preparation and instillation of cocaine, the right lens was removed, a small iridectomy being made as in the left eye. Patient, directly after the lens' removal, counted fingers, and after the eye had been dressed by the application of a pad of sterilized cotton moistened with sublimate water 1 to 5,000, and the application over this of a sterilized roller bandage, was returned to her room, using the elevator and portable ward carriage. There had been no complications, the iris was well replaced, and the next five days passed with the only complaint, "that her head was continually going around," a disturbance of equilibrium which she connected with the ride on the elevator. By the sixth day the corneal wound had closed nicely, and the pericorneal injection greatly diminished, when pain set in, in the branch of the trigeminal nerve supplying the right upper maxilla. The neuralgia which was remittent in character, was very severe at night, and occasioned sleeplessness, digesting disturbance, but no appreciable amount of fever. The eye upon the following day showed an increase in the pericorneal injection, but not in intraocular tension; the aqueous humor remained unclouded, the iris normal in color and vision clear. Quinine, antikamnia, arsenic, sodii salicylas and phenacetin, all in turn failed to control the pain, and only the use of Brown Sequard neuralgia pills during the day with hypodermic injections of morphia at night made the patient comfortable. November 13th, seventeen days after the last lens extraction a dentist was called in, who removed eight carious teeth. The neuralgia at once greatly diminished in severity, and gradually ceased, the pericorneal injection, at the same time, growing daily less and less, so that the patient was able one week later to leave the hospital and return to her home. Vision at this time was, with +10. spherical lens, $\frac{15}{\text{xxx}}$ with the left eye, and $\frac{15}{\text{LXX}}$ with the right.

Notwithstanding it is not an uncommon occurrence to meet with patients afflicted with neuralgia of the fifth nerve where the eye, without existing disease or previous operation, became highly congested with intense photophobia and great epiphora. I find no mention, upon reviewing the various works on opthalmology at my command from Grafe-Saemish, down to the present time, nor in the discussion of complications of cataract extraction and subsequent healing by Drs. DeSchweinitz, Jackson and Risley, as published in the OPHTHALMIC RECORD of May 14, 1894, of trigeminal neuralgia as in any way influencing the outcome after an operation for the extraction of a cataractous lens. Profound mental impression as well as decayed or ulcerated teeth is recognized as an etiological factor in provoking a neuralgic attack. In my patient, the disturbance occasioned by the elevator ride was greatly complained of, and, with the shock occasioned by the operations, may have had something to do with determining the time of onset of the trigeminal pain. The lesson taught by this case is that the teeth should be examined and enquired into ere a delicate operation of any kind is performed upon the eye. Besides the intimate connection between a glaucomatous outbreak and neuralgia involving the fifth pair of nerves is well established, and it is not impossible that iritis may be likewise occasioned thereby after a cataract operation made either with or without an accompanying iridectomy. My usual after-treatment following a lens extraction and carried out in this patient is a dressing of absorbent cotton (sterilized), moistened with sublimate water 1 to 5,000, and over this a sterilized roller bandage. This is renewed daily after the second day, and beginning with the sixth day a couple of drops of a one per cent. solution of atropine are instilled once or twice in the twenty-four hours. Confinement to bed is enforced the first two to four days, depending upon the patient and the progress in healing.

Eight months after my patient returned home, I had a letter from her physician saying that vision remained very good in both eyes.

OPTOMETRY BY THE SUBJECTIVE METHOD.*

By DR. GEORGE J. BULL, Paris.

In the present state of ophthalmological science it is obviously impossible to dispense with the subjective methods of optometry. Every experienced practitioner, however, will be aware that the exactitude of these methods is impaired by many serious sources of error. The object of the present paper is to direct attention to certain considerations by which some of the most important of these dangers may be largely eliminated.

Subjective optometry is, by the nature of the case, to be divided in practice into the diagnosis of ametropia in general, and the specific diagnosis of astigmia.

The considerations to which I would direct attention have relation to the relative priority of these parts of the examination. If the patient be first examined by general tests for the purpose of determining the degree of myopia or hypermetropia, as the case may be, while the possible presence or degree of his astigmia is undetermined, the conclusions to be drawn from his answers will, according to my experience, be liable to very large elements of error.

It is a commonplace of ophthalmological practice that it is much more difficult to determine correctly mixed or hyperopic astigmia than it is to determine the exact correction of myopic astigmia. This difficulty led me, for my own guidance, to state the problem presented in our practice in the following form:—

The presence of astigmia manifestly affects the range of accommodation towards the remote point and also towards the near point, but leaves it practically unaffected in the intervening space. Let us say, therefore, that the range, in the case of the astigmic patient, may be divided into three zones. Supposing, for the sake of clearness, that we assume a full range of 5D. of accommodation in an eye of which the horizontal meridian is emmetropic, while the vertical meridian has 1D. of myopia. The result of this 1D. of astigmia is to resolve the range into what I venture to call a *remote zone* of 1D. in extent, within which the patient can accommodate for vertical lines, and not for horizontal lines; a *mean zone* of 4D. in extent, in which he can accommodate for either; and a *near zone* of 1D. in extent, in which he can accommodate for horizontal lines and not for vertical ones. If an object containing both horizontal and verti tical lines is exhibited to this patient anywhere in the mean zone, he will be able to see it with a degree of distinctness practically sufficient for ordinary purposes, because, although at any one instant the vertical lines may be to him different from the horizontal, he can in practice focus first for the one and then for the other by an alternating arrangement of extreme rapidity, of which he is probably altogether unconscious, and which, in the processes of ordinary life, has become perfectly habitual to him. This, at least appears to me to be the correct account of his method of vision. My present point, however, is that, if he were asked to look at the clock lines either with the naked eye at a distance which was in fact in the mean zone of his range, or with any spherical glasses which would produce an equivalent result, he would probably declare, even if he were a very accurate observer, that he saw no difference in the distinctness of vertical and horizontal lines. If, however, the same object were presented to him anywhere in his remote zone, he would be able to focus for the vertical lines, and would consequently declare that he saw them with distinctness, but he would be wholly unable to focus for the horizontal lines, and would consequently be obliged to report that he saw them blurred.

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*This paper was read at the meeting of the British Medical Association London, July, 1895.

This appears to me to afford us a simple and logical formula by which certain important possibilities of error in the subjective method may be avoided. That formula is that *astigmia should in practice be examined only in the remote zone.**

Having stated the principle, it may be convenient that I should now restate the problem as it appears under the ordinary conditions of the consulting room. It will be apparent from what I have said that it will in many cases make a very important difference whether the examination for general ametropia is or is not carried forward to its apparent conclusion, before the observer has determined the extent to which astigmia may be present. I can best illustrate this by a concrete case.

If, for example, we suppose a patient with a general myopia of 2D., who has at the same time a myopic astigmia of 1D., the existence of which is as yet unknown to the observer, what may happen is obvious. If the observer begins by endeavouring to determine the degree of general myopia, by following the common rule of giving the weakest concave spherical glass which most improves the visibility of distant test types, he will find that the patient sees best with —2.5 or —3, and the patient will certainly prefer —3 to —2. The fact is that in the given case the use of the —3 glass will cause the astigmia to be almost entirely masked, because at that point the patient can probably accommodate without any conscious difficulty for any or all of the lines of the clock. The clock is now in effect in his mean zone. If, therefore, the patient is not asked to look at the clock dial until the general ametropia has been, as it is supposed, completely corrected, the probability is that the astigmic patient will not observe any difference in the lines, and that his answers, however subjectively accurate, will be in fact misleading.

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*It is obvious that the examination might be applied in the near zone, but in practice this is never desirable.

If, on the contrary, the presence of astigmia had been first of all determined, the source of error in question could be eliminated without difficulty. Leaving objective methods out of consideration for the present purpose, it is quite possible to arrive, by a careful use of subjective optometry alone, at a very accurate result by the simple process of referring the patient to the clock dial at an early stage of the examination, when his vision is in the condition of what I may call the *appropriate myopia.*

In the case supposed, the condition is arrived at by the very simple expedient of referring him to the clock dial as soon as the observer has found the weakest spherical glass with which any one of the radii can be distinctly seen. As a matter of precaution, the process might be commenced with an even weaker glass, but all that is essential is that the trial of concave spherical glasses shall not be pressed beyond the point I have described.

In the case above supposed, the glass in question will be —2. Leaving this glass in the trial frame, let the patient now be given concave cylindrical glasses with their axis at right angles to the line which is distinctly seen until the transverse lines are seen with equal clearness. The weakest cylindrical glass which equalizes the lines represents the value of the astigmia, and the possibility of the error referred to has been eliminated.

Those who have done me the honour to follow the earlier portion of this paper will not need to be told that what we have done in effect is to exhibit the clock dial under such circumstances that it is in effect at or near the remoter limit of the remote zone. My own practice is always to transfer the patient's range of accommodation to such a point as will bring my clock dial to a position a little beyond the *punctum remotum* of his meridian of least refraction.

In hyperopic, or mixed cases, the same principle of reduction in the first place to the appropriate myopia can be applied with equal exactitude. Suppose, for example, a patient has an unsuspected astigmia of 1D., with a general hypermetropia of 2D. The process would then be to bring his range of vision back by convex spherical glasses, without regard to the clearness of the letters, as long as any of the lines in the clock dial remain clearly visible. In the case supposed, he would then have in trial frame a convex spherical glass of about 3D. For the purpose of our diagnosis he is then in precisely the same condition as the last case, and it is only necessary to give him concave cylindrical glasses in the transverse axis until the lines are equalized. The clock is, in fact, again brought to somewhere about the remoter limit of the remote zone, the whole range having been first transferred so as to imitate the simple case of myopic astigmia.

This astigmia being now reliably determined, the diagnosis of the general ametropia can be completed by the obvious process of leaving the cylindrical glasses in situ, and trying back with spherical glasses, according to the ordinary rule, until we have found the weakest concave or the strongest convex spherical glass with which the distant test types are best seen.

It will be observed that, by the method proposed, the familiar difficulty of hyperopic astigmia is removed by the simple expedient of converting the problem in each case into the myopic form. This I suggest, is not only convenient in practice, but is also the logical and appropriate method of resolving correctly the problem which is presented to the practitioner. I suggest, therefore, that the conclusion arrived at may be easily and correctly set out in some such rule as this:—

"Before attempting to correct the general ametropia, determine the meridian of least refraction, if any; make that meridian slightly myopic, and at once determine the astigmia exactly by means of concave cylindrical glasses in the transverse axis; finally, with the cylindrical glass in situ, complete the correction of the general ametropia by adjusting the spherical glasses according to the common rule."

It will be obvious to those who have followed the reasoning of my paper that this rule may be more briefly stated in the form: "Make all astigmia myopic, and then measure it in the remote zone."

It is an incidental but a useful corollary of this method that it obviates the harassing and unsatisfactory process of trying backwards and forwards with concave and convex cylindrical glasses under circumstances which make it almost certain that the patient's answers will become confused; and also that it dispenses entirely with the necessity of resorting to the use of mydriatics for the purposes of subjective optometry.

SCIENTIFIC PROCEEDINGS OF THE SECTION OF OPHTHALMOLOGY. A.M.A., BALTIMORE MEETING, MAY, 1895.

(Continued from page 115 current volume.)

ECTOPIA LENTIS.

By Dr. FLAVEL B. TIFFANY, Kansas City, Mo.

In this article the various forms of ectopia lentis mentioned are spontaneous, traumatic, and congenital. Luxation into anterior chamber, into vitreous. Especial attention is called to two cases which are rare and unique.

1st. Traumatic simultaneous luxation of both lenses of an individual seen at Edgar Brown's Clinic, Liverpool, Eng., September, 1887, caused in altercation by a clutch of the fist. The lens in each eye was on sclera beneath conjunctiva a few mm. from inner and upper border of limbus, with rupture of sclera about 8 mm. long.

2nd. Congenital ectopia lentis in a family of nine children, seven of whom are thus afflicted, two being free. Father dead, but from history given by mother, he evidently had the same defect. In each of the seven children the lens of each eye was displaced in some direction from $\frac{1}{3}$ to $\frac{1}{2}$ of its width. With the pupil dilated, the fundus could be seen either through or at one side of the lens, one image being larger than the other. The lenses were all slightly opaque, and in every case there was iridodonesis. None had monocular diplopia. There were three girls and four boys. Age from four to nineteen years. The vision ranged from $\frac{3}{200}$ to $\frac{20}{200}$. They were all hyperopic, requiring from +3.50 to +3.00 D. S. The two unafflicted had normal vision, but were hyperopic +3.00 D. One of them had medullary sheath of grey fibers of optic nerve showing in left eye.

Mother, forty years of age, had normal vision with slight hyperopia. Father and mother were of no blood relation. The treatment suggested was that of iridectomy, discission and extraction.

The most interesting question is etiology, why in the first place it occurred at all; secondly. why only seven should be afflicted and the other two escape; thirdly, why all but one should have the displacement of the lens outward; fourthly, whether it is due to arrest of nutrition or development.

In the primary infinitesimal amount of protoplasm from which the body is evolved there are inherent all the potential elements and qualities that may go to form the perfect being in all of its minutiæ; but if these potential elements are viciated by abuse, by profligacy, by dissipation, by debauchery, or by excesses or intemperance, in any direction, the impress in some way is most sure to be visited on the prenatal child. These freaks and anomalies are then the direct consequences of the violation in some way of the great laws of nature, and whereas it is not in our power to alleviate the present, we should ever be on the alert, by judicious and timely advice, to exert our influence in protecting future generations against viciated inheritancy, that they may not be deformed or crippled in their physical or mental development.

DISCUSSION.

DR. J. L. THOMPSON, Indianapolis: As regards the traumatic case reported by the writer, I had the opportunity of seeing a similar one at Moorfields in 1880, a dislocation of both lenses through the sclerotic and beneath the conjunctiva from the kick of a horse, and which was written up by the curator of that institution. Congenital ectopia lentis is by no means infrequent. I have met with many cases, several of which have been reported in medical journals. All of them have been outward, directly or indirectly, all its subjects were myopic in a high degree. In two of these cases the lenses subsequently fell below the pupil and hypermetropia in an equally high degree, was found. In one case the lens was dislocated into the anterior chamber and suffered to remain there until permanent dilatation of the pupil was caused and a temporary glaucoma which disappeared on the removal of the lens.

DR. A. R. BAKER, Cleveland, Ohio: I have seen but few cases of ectopia lentis. A few years since, while on a visit to Warren, Pa., my attention was called to a boy in the county courthouse who had ectopia lentis, together with a complete absence of the iris in both eyes. On the afternoon of the same day I saw another case in the jail at Meadsville, Pa. These are the only two cases I have ever seen of dislocation of the lens with absence of the iris.

DR. HAROLD GIFFORD, Omaha, Neb.: I had a family of three boys in Omaha, aged respectively ten, eight and six years, each with ectopia lentis. The eyes of both father and mother were normal, and so were those of the next three children following the ones mentioned above.

Dr. F. C. Hotz, Chicago, Ill.: I wish to report a case of congenital upward displacement of the lens of each eye with central pupils. The boy, six years old, had acquired the habit of throwing the head back and half closing his eyes, evidently for the purpose of relieving the visional embarrassment caused by the high hypermetropic refraction in the lower and the high myopic refraction in the upper half of the pupil. To relieve this visual trouble, and thereby remove the peculiar habit of the boy, I decided to render the lenses opaque by needling. The operations caused no irritation in the eye, the lenses became opaque so that four months after the last operation, the edge of the lens was not visible in the undilated pupil. The boy holds his head perfectly straight and opens his eyes in a natural way. He is not able to read yet and the degree of vision cannot be determined. The refraction was measured by retinoscopy and the proper glasses prescribed.

Dr. B. A. Randall, Philadelphia: The direction of displacement is noteworthy. Asymmetry, inward or outward, is usual in the congenital cases, but both lenses are apt to go to the right or left in the traumatic instances. Why the zomule is defective in these individuals as yet lacks explanation. The ocular apparatus is otherwise commonly perfect, the eye presenting the usual 10. D of apakial hypermetropia, but through the lens they show high myopia, not only because of the excessive sphericity of the lens by reason of lacking tension on its periphery (a good demonstration of the Helmholtz theory of accom modation), and because of anterior displacement of the lens and its focus. In a dozen or more cases of my own, the displacement has always been upward and inward.

Dr. Herbert Harlan, Baltimore, Md.: I have seen three cases in one family from West Virginia. The children were all under ten years of age. In one of them a needling operation was done, and some months later Dr. Kuykendall, of that place, reported that, with his glasses, the vision of this child was greatly improved.

Dr. S. L. Zeigler, Philadelphia, Pa.: I recently presented before the Ophthalmological Section of the College of Physicians of Philadelphia, two cases of congenital ectopia lentis, occurring in brothers, numbered respectively four and five in a family of six, all of whom were healthy. The others were free from ocular defects. There was no history of heredity. The younger brother had symmetrical displacement of the cataractous lenses up and out, with compensatory displacement of the pupils down and in, leaving a free visual area. The refraction was that usual in aphakia. The older brother had a cataractous lens in the right eye dislocated downward and projecting backward into the vitreous. In the left eye the lens was dislocated up and in, was semi-transparent and the refraction of the eye, myopic. Some years later the lens in the left eye became opaque, and in May 1894 discission was performed with a Hay's knife-needle, leaving a clear pupil. The refraction was that of aphakia and visual acuity was well preserved.

Dr. J. A. Lydston, Chicago, Ill.: While my experience has been somewhat limited with respect to cases of ectopia lentis, it nevertheless seems advisable while considering such cases to note the causes of congenital dislocation of the lens. We assume the cause to be a relaxation of the zomule of Zinn, due either to congenital defect or to degenerate changes subsequent to uterine life. Cases are known in which the lens is spontaneously capable of dislocation into the anterior chamber and providing no swelling of the lens ensues, it is replaceable by placing the patient upon his back. With regard to the change in the refraction of the eye in case of ectopia lentis, of course the lens when relaxed from the ordinary state of tension brought to bear by the zonule of Zinn, has a tendency to assume its most convex form, and necessarily the refraction will vary in accordance with the position of the lens, being either hypermetropic or myopic as the greatest or least convexity of the lens is brought in front of the pupil. As to operative procedure, it seems to me that the safest course, in such cases as demand operative interference, would be extraction of the lens in lieu of iridectomy of discission.

Dr. R. C. Hodges, Houston, Texas: Two years ago I reported a case of double ectopia lentis symmetrical, under observation for three years, which later I operated upon for a complete dislocation into the anterior chamber. Six months ago a sister of this patient was brought to me in the same condition. Having just reached scholastic age, the eye trouble had first come to notice. There are other members of the family still younger and I shall keep them under observation. I should prefer in all cases an iridectomy and extraction to the needling of a dislocated lens.

Dr. Flavel B. Tiffany, Kansas City, Mo.: Dr. Randall's experience as to the direction of the dislocation in case of ectopia lentis, is certainly contrary to my experience, and I believe, in general, certainly to all literature on the subject. In congenital ectopia lentis we do not have, as a rule, fluidity of the vitreous and no floating about of the lens; only a swinging backward and forward movement, but in spontaneous luxation, or from traumatism, the lens may be floating in the vitreous or lodged even in the anterior chamber. As to the operation of needling, which Dr. Hotz speaks of, I believe that iridectomy would give better results and be much the safer operation.

ENCHONDROMA OF THE CARTILAGE, UPPER LID.

By PETER D. KEYSER, M.D., Philadelphia, Pa.

In 1888 Mrs. P. aet. 58 presented herself at my clinic at the Will's Eye Hospital with a round lump in the upper lid, which she said had been slowly growing for a year or two. No inflammation was connected therewith. It was hard, solid and firmly attached to the cartilage. An incision was made along the lid over the tumor and the convexity of the latter shaved off. This was firm, cartilaginous, cutting crisply and of a yellowish white appearance. It had all the appearance of a thickened cartilage. No microscropical examination was made of the part removed.

In 1890 she came back with a much larger return of the growth. It was again operated on as in the former method. No examination made. In 1892 it had grown again and more nodular. My purpose now was to try to remove all of the diseased cartilage, leaving if possible the conjunctiva, so as to protect the cornea. To do this the edge of the lid was carefully slit up, and, as much as could be of the cartilage, down to the conjunctiva, removed. This seemed to do very well for a while, but after six or eight months it began to develop again quite rapidly, growing along the whole cartilage, taking upon itself a well-developed nodular form, and with a small open sere on the edge of the lid.

Operative influence was again necessary to remove the unsightly looking lid and to relieve distress; so, on September 11, 1894, the edge of the lid was carefully slit and the skin dissected up so as to expose the whole growth. The whole cartilage of the nodule on the nasal side was removed with the conjunctiva, while that of the temporal side was dissected out as much as possible, leaving the conjunctiva.

After the operation on September 11, 1894, Dr. Currie, chief resident surgeon and acting curator of the hospital, preserved what was removed for preparation and microscopical examination. After some time he presented me with some carefully prepared slides and called my attention to a number of cells, as are exhibited in enchondroma. After very careful examination it was decided that the growth was enchondromatous formation, and as it was a simple outgrowth from the normal cartilage, might come under Virchow's term of Ecchondrosis.

Dr. Clarence P. Franklin was kind enough to make a drawing of the eye just previous to the operation, and also to make the accompanying sketches from the slides under the microscope, showing the fibrous and cartilaginous nature of the specimen. There are well developed fibrous walls with the cartilaginous cells lying therein, some separated, while in others they are packed closely together. There is also granular tissue.

This character of growth in this place seemed somewhat strange and to me new, and search has been made in all the works on ophthalmology in my library to find if such a growth in that part has been noted. An examination of all the text-books on ophthalmology published in English, German and French, so far has failed to find any report of such a growth except in Fuchs, in the chapter on the tumors of the lids he writes: "In consideration of the complicated structure of the lid, in which such a manifold variety of tissues take part, it should not surprise us that the most dissimilar kinds of tissue should at times come under observation. As rare occurrences there have been observed fibromata, enchondromata, etc., etc., etc., of the sebaceous glands (including Meibomian glands and the glands of Krause) of the sweat glands and the glands of Moll, etc.

Search has been made in all of the German, French and English Ophthalmological journals from their beginning and no case found reported. The Jahres Bericht "uber die Leistungen und Fortschritte im Gebrete der Ophthalmologie of Nagel, and Index Medicus" have been looked through and no case reported.

Fuchs is the only one so far found calling attention to the fact of such a growth taking place on the lid.

I present the case as one of very rare occurrence.

DISCUSSION.

Dr. F. C. Hotz, Chicago, Ill.: As this report has shown by careful search of literature that so little has been reported, in fact, nothing, it must be of very rare occurrence indeed. I have been interested in hearing this case but have nothing to add as I have seen nothing like it.

Dr. J. L. Thompson, Indianapolis, Ind.: The case reported by Dr. Keyser is exceedingly interesting and valuable as it shows us that cartilaginous growths may invade non-cartilaginous tissues. Just how this is brought about remains for future investigation to disclose.

Dr. S. L. Zeigler, Philadelphia, Pa.: Some years since, a case of enchondroma of the tarsal cartilage was operated on by Dr. Goodman in his clinic at the Will's Eye Hospital. It was supposed at first to be a simple chalazion, but when it recurred larger in size and harder in texture, it was diagnosed enchondroma. The eyelid was removed later but this did not prevent involvement of the facial and cervical glands. The patient afterwards went to the German hospital where these glands were removed and proved to be sarcomatous. The patient died later of some metastatic involvement. The microscopical report will be recorded at some future time.

Dr. P. D. Keyser, Philadelphia, Pa.: In closing the discussion I have really nothing more to say, having given all I really know of this matter, in the description of the case in my paper

FORMALIN AS A PRESERVING AND HARDENING AGENT FOR EYE SPECIMENS, WITH EXHIBITION OF PREPARATIONS

By WILLIAM H. WILDER, M. D., Professor of Ophthalmology,
Chicago Policlinic.

There are many disadvantages accompanying the use of Müller's Fluid and Alcohol for hardening eye speimens. The former so discolors the tissues that beautiful microscopic preparationsare difficult to obtain; while the latter, unless cautiously used, causes much shrinking and distortion of the spec-

To overcome these objections, Formalin, a 40% aqueous solu-

imens.

tion of Formaldehyde, may be used.

This may be diluted with water to any desired strength. The author has found a 5% to be the most useful, and the specimens exhibited were hardened in such a solution.

Immediately after enucleation the blood is washed from the eyeball and it is dropped into a bottle containing several ounces of the 5% solution.

In a few days it will be hard enough to bisect, which can be done with a razor, without first freezing, provided the contents of the globe are solid; if, however, the vitreous, either normal or fluid, be present, it is best to freeze the eyeball before cutting, as the Formalin does not harden the vitreous sufficiently.

The half to be preserved is then treated according to the method of Priestly Smith, by placing it for twenty-four hours in a $33\frac{1}{3}\%$ and then a 50% solution of glycerine and water.

After this it is mounted in a glass cup in glycerine jelly (Formula of Priestly Smith).

To prevent the softening of this jelly, which begins to melt at about 120° F., it is well, before sealing the jar with a glass cap, to subject the contents to the fumes of Formaldehyde, which permanently solidifies the gelatin. This is done by placing the specimens under a bell jar beneath which there should be some of the pure Formalin in a small cup. The vapor of this in such a small, confined space is sufficient to harden the gelatin so that boiling will not soften it, thus insuring the permanency of the preparation after the_cup has been sealed.

In such specimens the cornea and lens retain almost their normal transparency, so that the color and details of the iris may be distinctly seen. In some cases the ciliary vessels are seen to be injected, and the retinal vessels may be traced even to small branches.

As an agent for preserving and hardening anatomical and pathological specimens this has no superior.

DR. F. C. HOTZ, Chicago, Ill.: Dr. Wilder, not being present to read his paper on "Formalin as a Preservative for Eye Specimens," I will exhibit his specimens, and wish to state that they certainly show a state of preservation greater than anything accomplished by any substance before known. Dr. Wilder gave me a short synopsis of his method of preparing them. The eyes after removal are simply washed in water and then immersed in a jar filled with solution of formalin (5% solution in water of the standard 40% solution). They are left thus for three or four days, when they are hardened to about the consistence of a ball and can be cut easily. If the vitreous is to be saved they had best be frozen before cutting. They should be mounted in jelly of glycerine, the preparation of which was given by Priestly Smith, in 1884. Dr. Wilder has found, however, that this preparation of jelly softens at any temperature above 100°, but that it may be rendered insensible as it were to temperature variations by exposure to the fumes of Formaldehyde.

DISCUSSION.

DR. H. V. WURDEMANN, Milwaukee, Wis.: Formalin is undoubtedly a remarkable preservative fluid and hardening agent. I have used it for six months, and have found it all that has been claimed for it in that respect. Specimens of tissues can be hardened in twenty-four hours, stained and mounted for microscopic examination, This method does not in the least interfere with, but rather facilitates, staining of the sections. The preservative qualities are remarkable. Tissues simply exposed to the fumes of an open bottle of the commercial 4% solution under a bell glass for an hour or two, kept indefinitely even in the open air. The colors of flowers may be preserved in this manner. Over three months ago I left a pig's eye with a mass of orbital fat and the muscles in an open cup, in which there was a 5% solution. This yet remains in as good condition as regards perservation and natural color of the tissues as the day on which it was first put in. I would call attention to the exquisite manner in which the preparations of Dr. Wilder have been made, and especially to the retention of the natural clearness and coloration of the tissues.

Dr. H. M. Starkey, Chicago, Ill.: I wish to add my testimony as to the value of formalin as a preservative agent. Not only is it of value for the preservation of pathologic specimens, but also in preparing normal eyes for demonstration in class work. We have been using for several months at the Dispensary Clinic in Chicago, some sheep's eyes, kindly prepared for us by Dr. Wilder. Not only are the mounted specimens valuable, but the unmounted eyes can also be used for section and dissection before the class. As noted by Dr. Wurdemann, they seem to keep indefinitely. Some of these have been divided by cross section and have been handled day after day for months, remaining in the open air all this time with no change, except perhaps a separation and loss of the vitreous. These specimens show the anatomy of the ciliary processes and muscles, which is so difficult for the student to understand, more plainly than any other method with which I am acquainted.

Dr. E. J. Bernstein, Baltimore, Md.: I would like to know whether the eyeballs hardened in formalin shrink or take up the analine stains as well as those hardened by other processes.

Dr. H. V. Wurdemann: They do not shrink and they take up stains as well as when hardened by other processes.

Dr. G. E. deSchweinitz, Philadelphia, Pa.: I may add my testimony as to the value of formalin. So far as I know, it does not interfere with any stains that may be used in later microscopical examinations, and similar testimony comes from Dr. Gray, in Washington. I desire to express my best thanks to Dr. Wilder for his beautiful preparations.

INFILTRATION ANESTHESIA IN OPHTHALMIC PRACTICE.

By H. V. WURDEMANN, M. D., Milwaukee, Wis.

ABSTRACT BY C. W. ROOT, M. D.

H. V. Wurdemann, of Milwaukee, stated that since the introduction of the infiltration (or Schleich) method of producing local anesthesia to the American profession six months before, many favorable reports have been received in regard to its efficacy and application.

Experiments proved that a variety of fluids when injected *into* but not under the skin, would produce a practical local anesthesia, having the advantage over anesthetics like cocaine as formerly used, from the fact that the solutions employed were so weak as to be entirely harmless.

Distilled water injected into the skin produced anesthesia but the injection itself was painful; while a normal salt solution was painless but caused no anesthesia. Between these two was found a solution (two-tenths of one per cent. sodium chloride) which produced practical anesthesia and at the same time was painless when injected. .2% solutions of cocaine, morphine, and carbolic acid, and other solutions were similar in effect and when added in minute quantities prevented the pain of infiltration by different solutions. The efficacy of the anesthetic fluid is also increased by cooling.

From the minuteness of the doses employed it is evident that the resulting anesthesia is not due to any extent to the physiological effect of the narcotic drugs, but to the application of the solution into, instead of under, the skin, thereby replacing the normal fluids of the tissues by a fluid of less specific gravity, which causes anemia, compression, and cooling; thus producing a temporary paralysis of the nerve filaments.

The field of operation is made aseptic, the solution cooled, and a few drops injected intracutaneously with a fine pointed needle passed obliquely under the epidermis to the papillary layer, thus producing a white, elevated wheal anesthetic throughout the entire thickness of the skin, lasting from ten to twenty minutes. The needle is inserted in the periphery of the wheal and a similar one produced and process repeated till the area is inflated to the required extent and depth. If the operation lasts longer than twenty minutes the infiltration must be repeated.

By cooling the spot selected for the formation of the first wheal by ether or rhigolene spray, or touching mucous membrane with cocaine solution, the first injection may be made without feeling even the prick of the needle. It must be remembered that anesthesia exists only throughout the extent of the edema produced by the infiltration, but any tissue of the body may be anesthetized that can be thus artificially edematized. Painless operations have been performed from ovariotomies and amputations down to the opening of boils and felons, circumcisions, lid operations, excision of tumors, etc.

Infiltration anesthesia is particularly valuable in ophthalmic work when incision through the skin is required where cocaine instillation is inapplicable or where the operation is too trivial for chloroform.

After the discussion of Dr. Wurdemann's paper had closed, the technique of the injection was shown upon the arm of one of the ophthalmologists there present, then a patient was introduced by Dr. Harry Friedenwald, of Baltimore.—This man had two sebacious cysts on his forehead, one the size of a pigeon's egg and the other smaller. The tissues were injected by Dr. Wurdemann with solution 2, and the growths excised by the patient's surgeon, six stitches being taken in the larger and two in the wound of the smaller growth, without the patient experiencing the slightest pain or feeling either the injection or the operation.

DISCUSSION.

Dr. Gilbert E. Seaman, Milwaukee, Wis.: I have nothing to add in relation to this method of anesthesia as applied to operations on the eye, but owing to efforts of Dr. Wurdemann the method has come into quite general use in minor surgery in our part of the country, and when applied with the usual care and skill, is certainly very satisfactory. I have used it several times experimentally, once in the removal of a small cyst of the scalp with entire satisfaction, except that the injection of the first wheal gave some pain. As stated by Dr. Wurdemann the injection of pure water into the skin is exceedingly painful and the pain caused in my case may have been due possibly to the solution not having been properly prepared.

Dr. G E. deSchweinitz, Philadelphia, Pa.: I have seen a number of operations done as Dr. Wurdemann described, and in only one was there any pain. It was in the extraction of a piece of bone from the hand. The temperature of the operating room though was nearly 100° and that may have had something to do with it. I once tried the method in an enucleation but don't think I will do so again.

Dr. G. E. Dean, Scranton, Pa.: As bearing indirectly upon this subject I will mention two cases: the first was one in which I observed that I must use a smaller dose of strichnia when injected into the skin than when injected under the skin. The second one illustrates the danger sometimes encountered in injecting strong solutions of cocaine. Some years ago I used 3 m. of a

4% solution of cocaine for the removal of a slight growth in the palm of the hand. Anesthesia gradually developed in this patient, (a female of 33 years) until one-half of the entire body was anesthized. Then the heart's action went down so alarmingly that I had to use Faradism for half an hour to prevent a fatal issue. Since then I have been chary in the use of this drug hypodermically, and I am glad to learn from this paper that very weak solutions can be used successfully.

DR. J. C. DUNLAVY, Sioux City, Iowa: The ill effects attributed to the use of a drug are often not correct. I think that in the hypodermic injections of morphia alone we have sometimes an extreme shock not due to morphia. I have had the same experience with the use of cocaine hypodermically, and once thought I had poisoned a patient, but on experiment on the same patient later with water, produced precisely the same results, and assured myself that the trouble in the first instance had not been due to cocaine.

DR. FLAVEL B. TIFFANY, Kansas City, Mo.: I would like to ask Dr. Wurdemann if he has ever used air as a medium instead of a fluid anesthetic? It occurred to me that it might be substituted for fluid, and if so would be even safer in introducing the probe to relieve the strictures of the lachrymal sac. I have accidentally caused emphysema of conjunctiva and skin with perfect anesthesia of the emphysematous parts.

DR. A. C. CORR, Carlinsville, Ill.: In regard to the pain caused by the first insertion of the needle point, I have noticed that there are small areas not painful to such prick, lying immediately adjacent to areas that are painful. This I think will account for some of the differences of opinion as to the pain of first insertion. Sometimes individual singularities are attributed to the drug. I once had a strong young man faint, on reversion of the upper lid, and know of a gentleman in my town who has often to quit the barber's chair when being shaved, and walk the floor to keep from fainting. There are many persons who cannot endure titulation of pricking of the skin without approach, more or less well marked, to shock or faint.

Dr. H. V. Wurdemann, Milwaukee, Wis.: There are two principal requisites for securing satisfactory anesthesia by this method. First, the solution should be of a proper specific gravity, i.e. of the required formula. Second, the operator should have had sufficient experience with the technique of the injection. This can best be done by having the injections made first on his own arm, and second, by doing it several times on others, before attempting any operation; a cleanly conscientious operator should have success both in the anesthesia and the healing. The solutions should be used cold, as they lose most of their efficacy when injected at or near the temperature of the body. It is preferable to withdraw the needle after formation of the first wheal and insert the needle only until the hole in the point is under the epidermis, as burying the whole needle in the skin causes some pain if the first puncture be made in this manner.

I have noticed that when emphysema has been produced by surgical accidents, the tissues seemed less sensitive, but think that the injection of air might produce infection, and have not experimented with it for the purpose of producing anesthesia. No doubt the dangers of cocaine injection, are less than have been reported, as many of the cases of sincope occurring in my office after the use of cocaine happened in neurasthenic subjects, some of whom would faint from the mental shock caused by any procedure, even one so simple as the dropping of medicines into the eye.

Dr. B. Alex. Randall, Philadelphia, presented the "Report of the Committee on the Examination and Care of the Eyes during School Life." [Abstract not furnished.—Editor.]

DISCUSSION.

Dr. P. A. Callan, New York, N. Y.: I am in entire sympathy with the report of the Committee, and think that whatever we are to gain is by agitating and educating the public up to the point of appreciating the necesssity of such medical oversight of the schools. It is now twenty-one years since I made my examination of the negro children, and I fully appreciate the amount of time such thorough examinations consume. Since Ware's report before the Royal Society in 1812, until the present time there is a vast difference in the thoroughness of methods. Ware took the word of the surgeons in charge of the foot-guards that there were practically no cases of myopia amongst the soldiers. In large cities there ought not to be any great difficulty in securing ophthalmologists to do the work, especially if the medical societies will back them up and advise examinations.

Dr. S. D. Risley, Philadelphia, Pa.: The question of school examinations is one in which I have been deeply interested. I am fully in accord with the views set forth in the elaborate and most careful report of the Committee. I am particularly pleased with their plea for careful work and attention to every detail in these examinations.

They very properly urge that, without this, the work is simply a waste of time and energy. If the result reached in each eye examined is not accurate, the lesson deduced fron the finding is a false one and therefore misleading and worse than useless. In my own work in 1878 to 1880 I secured the aid of five skilled and well trained helpers, to each of whom a definite part of the examination was set apart, the examination covering most of the points detailed in the admirable plan presented in the report of the committee to-day. After these preliminary facts were secured the pupils presented themselves in the dark room where I made a careful ophthalmoscopic examination, dictating to a clerk the state of the refraction, appearance of the fundus oculi, and sketching any notable change in the eye-ground. The average time spent over each case by myself and the five assistants was twenty-eight minutes, and the results secured enabled one to make an intelligent diagnosis in every case examined. It is very important in these investigations that the examiner should avoid giving opinions as to the state of the vision to the pupils examined, no matter how defective the eyes may be, or how urgently an opinion may be sought by the pupil. The general trend of the results is all that can be safely divulged, and these to properly constituted authorities. The individual should be left out of the consideration except in those special preliminary examinations made by duly authorized persons to determine the fitness of a pupil to enter the school.

The examinations completed, three full school-years having been devoted to it, an additional year was devoted to the tabulation and analysis of statistics by Dr. Randall, the Chairman of your Committee, and myself, and the results were presented in April, 1881, to the Philadelphia County Medical Society, and later in the same year before the Pennsylvania State Medical Society. This report is in the Volume of Transactions of 1881. The results verified the report of other observers as to the steady rise in the percentage of myopia from the lower to the higher classes. I here present a copy of the percentage curves by which the results were graphically portrayed. A study of these curves will show that the work did not stop however with the verification of this well known fact, but sought for the relation between the increase of myopia in the schools, bad hygienic environments and the existence of congenital abnormalities in the eyes of the pupils. In this respect the endeavor at that time was entirely new, and led to some most important and interesting conclusions.

Since the emmetropic eye had been observed to remain in practically uniform percentage throughout all classes, it was regarded as the intermediate eye between the hypermetropic and myopia; that the first, gradually distended under the strain of school-life, becomes emmetropic, while the emmetropic, by a similar process, became myopic. My study, however, revealed the important fact that, not only did these emmetropic eyes remain constant in percentage throughout the school life of the children, but they enjoyed the highest acuity of vision, the greatest freedom from pain and by far the lowest percentage of those pathological conditions which all recognize as characteristic of the eye with progressive myopia. The conclusion was therefore reached that the emmetropic eye was the model eye; and that its uniform percentage in all school grades was a demonstration of this truth, since they bore without harm the strain of school life. On the other hand the ophthalmoscope revealed that the eyes with hypermetropic astigmatism presented the commencing pathological changes which were seen at a later stage of their history in the crescents of chorioiditis at the temporal side of the optic nerve, and in the general retino-chorioidal disturbance, so characteristic of the eye with progressive myopia. In a word the eyeball distention and the pathological conditions upon which it depends, began in the eye with hypermetropic astigmatism and, with more or less rapidity, passed through the turnstile of mixed astigmatism into the myopic eye, at no time in their history becoming emmetropic. The picture is therefore the first commencing increase of refraction and choroidal disease in eyes with hypermetropic astigmatism, then the eye with mixed astigmatism, and finally the *astigmatic myopic eye.* This view finds confirmation in the paper on the meridians of corneal curvature, which I had the honor to present to-day, in which there was found but seven cases of simple myopia in both eyes, in 1300 cases of refraction, carefully measured under mydriatics by subjective examination, the shadow test and the ophthalmometer, i. e., 0. 5%, 99.5% being astigmatic. That this is the actual history of many cases of progressive myopia I have been able to verify many times by actual observation. I have already reported a large group of cases in which I had observed, in the course of a few years, the transition from hypermetropic refraction to myopic, through the medium of a mixed astigmatism. (Vid. Trans. Oph. Soc. Vol. III, p. 751 & Vol. IV., p. 102.) Since the publication of these cases I have observed many others. These results demonstrate the fact that the bad hygienic environments of the school-room are not solely responsible for the deterioration of vision in the schools, but that the chief cause is the large percentage of congenitally defective eyes which are permitted to enter upon the educational process without inspection.

If these congenitally defective eyes were first excluded, until their astigmatism and higher grades of hypermetropia were corrected by glasses, we should soon hear much less of progressive percentages of myopia in the schools. This remark finds confirmation in the results following the uniform correction of the errors of refraction in Philadelphia and vicinity, in all asthenopic eyes, for the past twenty years. A study of approximately 200,000 eyes, collected from my own case books and the prescription books of two large optical firms, revealed a steady diminution in both the percentage of myopic eyes applying for treatment and also in the degree of myopia found. (Vid. Trans. Oph. Soc., 1894 and Archives Ophthalmology 1894). The percentage of myopic eyes had fallen from 28% in the first period to 16% in the last, while cases of myopia of 10.D. or more had fallen 50%. These figures demonstrate the value of such corrections on the one hand, and on the other sustain the claims made in 1881 that the congenital defects of refraction were at the basis of the increasing percentage of myopia in the schools. It is interesting to note some of the practical results of this work in Philadelphia. In 1876 the School Board addressed a series of questions to the principals of the various school divisions regarding the hygienic conditions of schools, among them one referring to defective vision. One of the teachers replied to this that, in a certain division there was at the beginning of the term, then commencing, but two children with defective eyes, *i.e.*, who complained of them; but before the class was ready for promotion she would be compelled to use considerable "maneuvering" in order to get the children so seated that they would be able to read from the blackboard, because of their defective vision. In contrast to this, while preparing a paper on school hygiene in 1894, I had occasion to visit one of our large modern school-houses in Philadelphia, and asked the principal if she had any trouble growing out of defective eyes in the school? She replied, "Oh it is quite different now from formerly. The pupils are often sent to me with complaints about their eyes, but I send them home with a note to the parent. We miss them for a few days, they then return with a pair of glasses, and we hear no more complaint."

These facts, however, should not deter us from the most careful attention to every detail of school hygiene. The proper and sufficient lighting of the school-room, the adoption of suitable desks and seats in which the pupils can sit erect at their work, properly printed books, etc., should all be observed with great and scientific care; but all these will not avail to arrest the increase of myopia as long as we permit the entrance to the schools of children with abnormal eyes. It is obvious that first and foremost is the examination of every child by intelligent and authorized persons before they are permitted to begin the struggle with books. If every physician were in the habit of advising the families to whose professional necessities he habitually ministers, to have their little children's eyes examined by competent ophthalmic surgeons, or by himself if prepared to do so, before entering upon the school life, they would be doing good missionary service in the community.

Dr. A. J. Erwin, Mansfield, Ohio: I have long observed that the simpler methods that we can adopt the better in any department of life. The School Boards will not carry out any elaborate system of examination, especially if it involve any expense. I have set on foot in my district a very simple plan which seems to answer the purpose very well. I had printed cards to be hung in each schoolroom, the card having upon it an astigmatic diagram, a twenty foot line and a one foot line of letters with an explanation of the use of the card, and a request to the teacher to test every pupil's eyes, and the cases that they find with imperfect vision or any distress of the eyes or head they should advise to be sent to an oculist for examination.

DR. FRANK ALLPORT, Minneapolis, Minn.: There can be no doubt as to the fact that education goes hand in hand with degenerate eyes. Statistics have proven that myopia is almost a natural accompaniment of modern education. The only question is how can we best combat the existing condition,—how best diminish the amount of myopia incident to school life. There are ideal methods of doing it but they will not be accepted in the schools of this country unless possibly in cities like Philadelphia, where Dr. Risley has been for years educating to the idea of school hygiene. Not many cities, however, have reached that point. Where we cannot introduce the most ideal methods we shall have to do the best we can for the present, and hope for more as the process of educating the public goes on. I will quote from an article I recently published, a few paragraphs, in order to lay before you a plan that I think feasible, practical and reasonably scientific: "The ideal method would be to have a competent physician appointed by the proper authorities, whose duties shall be to pass upon the eligibility of all scholars, both upon entrance and at stated intervals. This, however, would be open to certain objections, would involve a salary which the different boards might be un-willing to pay, and would inevitably impair the efficiency of such a law, by a degeneration in the political jobbery. Besides this, the appointee would undoubtedly be distasteful to many pupils or patients, which would constitute an obstruction to harmony and an embarrassment to the examiner. In case such a method is deemed inadvisable, the next best procedure would be to require of each pupil a proper certificate from a reputable physician, stating the ocular condition of the applicant, with recommendations for relief if necessary. This, again, would be opposed by the people as compelling an ocular examination where it is perhaps unnecessary, thus incurring a useless expense to parents or guardians. It is true that a combination of both these methods might be adopted, and a law passed requiring that each pupil shall require an ocular examination, by a physician employed by the board of education, but leaving it optional with the parent or guardian whether the child shall be passed upon by the school examiner, or taken to a physician of recognized standing whom they themselves shall select. This would be a compromise measure but would still be open to the combined objection of both procedures in mitigated form. There is another method of dealing with the subject, proposed by the writer, which may not be considered sufficiently stringent and scientific by enthusiasts on the matter, but which the writer believes to be all that can be accomplished at present, and may pave the way for something more energetic in the future. It can be executed at practically no cost to our school treasurer; will but seldom cause useless expense to parents and guardians; can be universally applied; if thoroughly accomplished, will give general satisfaction. The idea is simply to have a physician of recognized ability deliver a lecture or talk on the subject to the principals of city schools, once a year, just preceding the opening of the school. This talk shall include plain and comprehensive anatomy and physiology of the eye, refraction, and how to use, but not abuse, the eyes in school and home work. It will also instruct the principals how to test the eyes, in accordance with the subjoined scheme. Besides this, printed directions for testing the eyes shall be given to each principal which might read something like this:

INSTRUCTIONS FOR EYE EXAMINATION.

The examination should be made privately and singly, in a room apart from the general school session. Place a card of Snellen's test-types on the wall in a good light; do not allow the face of the card to be covered by glass. The line marked xx (20) should be seen at twenty feet, therefore place the pupil twenty feet from the card. Each eye should be examined separately, holding a card over one eye while the other is being examined. Do not press upon the covered eye, as the pressure might induce an incorrect examination. Have the pupil begin at the top of the test-card and read aloud down as far as he can, first with one eye and then with the other. If the pupil can read xx (20) test-type with each eye and does not, upon enquiry complain of tired and painful eyes or headaches, he may be admitted to school; but if he cannot read xx (20) test-types with both eyes, or complains of tired or painful eyes or headache he should be sent home with a card of information to the parent or guardian. This card might read as follows:

MINNEAPOLIS, October 1, 1894.

DEAR SIR:—Your son, Jno. Smith, has been examined by me this day as to the condition of his eyes. I believe it to be advisable for him to consult a physician of recognized standing, from whom he must bring a certificate, stating it to be wise for him to continue his studies. (Some regular oculist is recommended). Without such certificate he must be denied admittance.

Respectfully,

MARY JONES,
Principal, Douglass School.

This scheme possesses many advantages. The physicians selected to deliver the lecture or talk to the principal would undoubtedly be glad to do so gratuitously, and much useful and practical information could be deduced therefrom, which would react most favorably on the scholars. The test-card could be procured at a nominal cost, not to exceed twenty-five cents, for each school, and the printed cards of instruction for principals, and the cards to be sent the parents or guardians would cost but little. The expense therefore of the entire outfit would be so small as to be unobjectionable. Then the test is so simple and easily accomplished, that any one of sufficient intelligence to be a principal of a school could soon master it, and examine the pupils with such ease and rapidity that a large school could be tested in a very few days. The average of two or three minutes to each pupil would be more time than is necessary, if systematic arrangements were made. The writer is well aware that such an examination is not ideal and is open to objections; but it is better than nothing, is fairly sufficient, can hardly antagonize interested parties, cannot savor of medical favoritism, involves practically no expense, and is so simple and practical as to commend itself to all parties concerned. In large cities the scholars would unquestionably consult oculists instead of general practitioners, and where the latter were consulted the patient would probably be referred to the former. Those not financially situated so as to render it possible to consult an oculist in his office, could procure equally good services at some dispensary. If such law were enacted in small towns, at least one or two resident physicians would find it profitable to become somewhat familiar with the subject; or children could be sent to a neighboring city for advice; or, if a fair number of cases were to be examined, an oculist could undoubtedly be procured who would be glad to make a trip into the country for a few days, to examine defective eyes in a tier of towns. The writer believes this to be the only plan for relief that can be procured at present, and as such trusts it may meet with the approbation of those interested in the subject."

Dr. Frank Fisher, Philadelphia, Pa.: While listening to the remarks of Dr. Risley upon the subject of changes from hypermetropia to myopia, this question occured to me: In the continued observation of myopic eyes, has there been found an appreciable percentage of cases directly traceable backward through emmetropia to hypermetropia? What percentage?

Dr. R. A. Reeve, Toronto, Canada: I have noticed that in many of the kindergarten schools, the children are given punctured cards with skeleton outlines of animals. With a needle and colored thread, they are required to develop the animals. They of course become very much interested in the work, but the practice is an injurious one and should be stopped.

Dr. Dunbar Roy, Atlanta, Ga.: Philadelphia is to be congratulated that it has been educated up to that point of hygiene to which it has been brought through the efforts of Dr. Risley and his associates. The suggestion brought forward by Dr. Allport in his remarks seems to me eminently proper, and that is that the teachers should be instructed in regard to certain eye symptoms so that if such be noted, the child could be sent to the physician. In my own state of Georgia, the people and teachers have not heard enough upon this subject, so that when two weeks ago I read such a paper before the State Association, I am sure that the physicians themselves had previously been entirely ignorant of this question. My point is that we should bring this subject nearer home, and not spend our time in discussing it entirely at such a national meeting.

Dr. Geo. H. Price, Nashville, Tenn.: I have been much interested in this question, and more especially so since I was appointed a member of this committee. That such examinations, if carried out in a systematic manner, would result in great benefit to our schools is quite apparent, as we could then be in a position to give proper and adequate advice to those needing it. The thorough and interesting work of Dr. Risely and Dr. Randall, in the schools of Philadelphia, shows conclusively that while the emmetropic eyes remain substantially emmetropic throughout the school period, the hypermetropic eye complicated by astigmatism tended to undergo retrograde changes, passing, as Dr. Risley has said, through the turnstile of astigmatism, to myopia in some form and apt to progress. These facts having been established, then it becomes incumbent upon us to apply such treatment in the form of lenses and corrections for heterophoria as seems to be demanded by the case under consideration. The suggestions of Dr. Allport and Dr. Roy, are deserving of consideration as methods for bringing to the attention of school authorities the necessity for, and importance of, measures designed to meet the requirements of the circumstances. In the larger cities much of the practical work of correcting defects and applying constitutional treatment, can be, and is done in the clinics designed for such purposes, but in the smaller cities this work will fall upon individual members of the profession.

Dr. Lucien Howe, Buffalo, N. Y.: It is useless to attempt to teach ophthalmology to the public by means of lectures. They simply say this is tradesunion talk, and personal advertising, of which it smacks. The better way is to give object lessons. This can be done in our offices, making the parents realize in cases of neglect how great the sin of omission is, and before Boards of Education, not to attempt lecturing but simply take the little victims of neglect before these Boards, and let the imperfect condition of vision speak for itself.

Dr. L. B. Ryan, Galesburg, Ill.: I simply wish to say a word in regard to what can be accomplished by agitation. A few years ago I read a paper before our Medical Society advocating a plan similar to that proposed by Dr. Allport. The paper created considerable comment, and I was invited to deliver a lecture before the teachers of the county, impressing upon them the necessity of watching the eyes of the children, and of having those eyes examined which were found to be diseased. They were advised to so impress these truths upon the minds of the pupils and parents that none would be neglected. As a result of this lecture many cases of suffering were relieved, and now it is a daily occurrence to have children sent to the office by the teachers for examination. One of our colleges, too, has instituted a complete system of physical examination.

Dr. Leartus Connor, Detroit, Mich.: The education of general physicians to a live appreciation of the facts well established respecting the disabilities of the eyes in school children is absolutely necessary to accomplish the best results in school hygiene. This can be done by personal effort with individual physicians and medical societies as opportunities present.

Dr. G. Edgar Dean, Scranton, Pa.: I am happy to have listened to the discussion of this subject and am satisfied that many sensible suggestions have been advanced. The summing up of the matter is that we must keep everlastingly hammering away at the subject wherever we can find listening ears. Of course the ultimate aim will be in the direction of proper legislation. In the mean time every single district impressed will act as an object lesson on a larger scale. It occurs to me that one important means of influencing opinion where it might be effective has been omitted in the discussion, that is, among the architects. I believe a circular embodying the information which has been gleaned from the work of competent scientific men on this subject sent out by this body to the architects, would be of great service.

Dr. J. L. Thompson, Indianapolis, Ind.: It has surprised me to hear so many of the speakers lay such stress upon the prevalence of myopia in the schools. My own experience has been quite the opposite. Asthenopia has been the great complaint which I have met with, and the examination for its cause has, I think, shown hypermetropia with or without astigmatism, in at least eight out of ten cases examined. Other speakers have complained of the general profession, that it was lax in recognizing and averting these troubles by sending them to competent examiners. On this point also my own experience is the reverse. Since S. Weir Mitchell called the attention of the profession some years ago to eye-strain as one of the causes of headache, our professional brethren have been constant in sending us their patients; indeed they sometimes go slightly too far in this direction, often leaving their investigation until the eyes have first been examined. Again they sometimes, after trying all sorts of remedies and failing therewith, determine that the eyes are the cause of said troubles, send them to us, and become greatly disgusted if we fail to relieve their patients.

Dr. B. A. Randall, Philadelphia,: I have brought before you as far as I could what should constitute an examination. Until we have an idea of what we want to do and how to do it, we cannot bring it to the attention of the people. The first one to be educated to the importance of the subject is the profession. We should first try to agree upon some desirable plan here, carry it to our State Societies throughout the Union, and then through them and the teachers, educate the public. I have read Dr. Allport's paper and think that much good work may be inaugurated by the teacher.

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The Atlanta Exposition,

Which is now fully open, will doubtless attract many thousands of people from all parts of our great country. Among the number there will likely be some of the readers of the RECORD, all of whom will find a hearty welcome, on the part of our confreres Calhoun, Hobbs, Roy and Crawford, awaiting them. Should you go through Nashville, on your way to Atlanta, stop over at least between trains and visit the office of the RECORD. The editor and his local confreres would be glad to see you in our city, and would take great pleasure in showing you courtesies.

It is only a year until we will expect many of you to make a special visit to Nashville, the attraction being the celebration of THE CENTENNIAL OF TENNESSEE'S STATEHOOD. We can promise you before-hand that there will be a medical committee to look after your wellfare while here, a year hence. The CENTENNIAL will be no small affair, and a visit to it will be both pleasant and profitable

Dr. J. M. Crawford,

Of Atlanta, who has been associated with Dr. Calhoun for a number of years, has established an office of his own in Atlanta.

Ophthalmometer and Vibrometer.

These two instruments, almost new, were purchased by a late confrere only a short while before his death. His widow now offers them for sale. For the Garey Vibrometer he paid $125.00, his widow offers it for $90.00. For the Javal Ophthalmometer (Model 1889) he paid $85.00, his widow proposes to sell it for $60.00. These instruments were in use less than six months. If you desire one or both of these instruments, address C., care of THE RECORD.

Muscle Advancement.

In the next issue of THE RECORD, we will publish a description of the advancement operation as performed by Dr. Geo. T. Stevens, of New York, and which was referred to in the discussion of the muscle question at Baltimore, by Dr. Thomas, of Philadelphia.

We will also publish in the next issue, a part of a recent publication by Dr. Valk, on muscle shortening. In this way the two operations will be again put in contrast. Between the two, operators can choose, not making any very great mistake if they were to adopt either the one or the other.

THE
OPHTHALMIC RECORD.

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ON THE UTTER NEGLECT OF THE EYESIGHT QUESTION IN BOARD OF TRADE ENQUIRIES INTO SHIPPING DISASTERS *

A Criticism of the President of the Board of Trade's Reply (Feb. 1st, 1895,) to the Deputation of Ophthalmic Specialists

By MR. T. H. BICKERTON. Ophthalmic Surgeon, Liverpool Royal Infirmary.

Although the public memory is notoriously short, it will hardly be forgotten that on the first of February last a deputation from the British Medical Association and the Ophthalmological Society, waited upon Mr. Bryce, who then occupied the position of President of the Board of Trade, to urge the adoption of more precise tests for the eyesight in the examination of the mercantile marine and railway employees.

It is no compliment to the gentlemen who formed that deputation, or to the carefully prepared case which they laid before the Board of Trade, that the visual test question is precisely in the same position as it was then. Possibly the President of that overburdened department of Government—the Board of Trade—thought that he was doing well by the deputation when he gave it courteous hearing, and that nothing further would result from his neglect to take action upon this important matter. In fact, Mr. Bryce in his reply to the unanswerable arguments

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*Read (Aug. 2nd, 1895) in the Section of Ophthalmology at the Annual Meeting of the British Medical Association held in London.

brought to his notice seemed to resent the mere suggestion that the Board of Trade had pursued the most enlightened policy possible in dealing with the question of Sailors' Eyesight.

It may, perhaps, seem a little ungracious to criticise that reply at this juncture; earlier action, however, on our part would have constituted a breach of the unwritten law of etiquette in such matters. It was promised us that the subject should receive careful consideration, and, as the wheels of officialdom run proverbially slow, a policy of passive waiting, in the hope that the result of this promised "consideration" would ultimately be vouchsafed, was practically the only line of action open to us. Mr. Bryce, too, it should be remembered, merely voiced the opinion of the permanent officials of the Board of Trade, and it is against their policy of inertia that my critisms are directed, rather than at the statesman who was then their head and mouthpiece. Mr. Bryce asserted that his "department had shown due diligence in dealing with the matter."

At this stage of the colour-vision and eyesight question it is perhaps unnecessary to expose the utter impudence and presumption of such a claim. It is well-known that the "diligence" of the department, to which is intrusted the safeguarding of the traveling community by land or sea has manifested itself, first in refusing to admit the danger of the color blind factor, and subsequently, when compelled by facts to abandon this untenable position, in stubbornly resisting any effort which sought to eliminate visually afflicted persons from serving on our railways or in our mercantile marine.

The action of the Medical Profession in persistently pointing out the dangers arising from visual defect, and suggesting the adoption of remedial measures, has been, until quite recent times, regarded in the light of mere faddism; and so long as discussions and recommendations were confined to the Medical Press, the subject was a closed book to the public, and the Board of Trade treated the views of those competent to give an opinion with undisguised contempt. That the rights of the case were unknown to the public may be gathered from the fact, that though the dangers of employing color-blind men as sailors were first pointed out in 1855, a leading daily paper stated in 1888 that "too much fuss is made about the supposed deficiency." For such a statement the public press may rightly plead ignorance. But no such plea can be put forward by the Board of Trade. They are well aware of the researches of Dr. Wilson (Edinburgh), whose work on "Colour-Blindness," published in 1855, will ever be a living monument to his labours; and they knew well of the efforts of Dr. Jabez Hogg—to whose admirable exertions I believe we owe the first Parliamentary Return on "Colour-Vision;" of Mr. Brudenell Carter, of Cantor Lecture fame; of Dr. Brailey (London); and last, but not least, of Dr. Joy Jeffries, of Boston, U. S. A., whose work on "Colour-Blindness" has done more than any other to point out to the English speaking people, its dangers and detection.

But to all advice the Board of Trade turned a deaf ear, and I believe it was not until I enlisted Dr. Farquharson's assistance to direct Parliamentary attention to the question, that the public began to be awakened to a due sense of the needless peril to which sea-goers were subjected from visually afflicted sailors, and the Board of Trade to see that they had the public and not the Medical Profession only to deal with. For when once the vital importance of the matter was pointed out to the General and Shipping Press, their voice has not ceased to make itself heard in the cause, and it has done incalculable good towards educating the nation to understand aright the risk which must ever accrue to lives and shipping property from colour-blind and defective-sighted officers and lookouts.

As far back as December, 1877, Dr. Caldwell, Surgeon on board the historic Cunarder "Russia," wrote to the "Nautical Magazine" as follows:

(1) "I hold that the quality of eyesight that was good

enough to steer clear of the old sailing packet, is by no means adequate to recognise surely and promptly the lights of the modern steamer, where the time for reflection is often limited to seconds."

(2) "That more collisions occur through mistaking coloured sidelights than almost all other causes combined."

The truth of the first statement, Dr. Caldwell goes on to remark, "is almost self-evident, and will be conceded when one considers the increasing rate of speed as compared with the more leisurely progress of the days when steam was unknown. The history of accidents from collision, and the conflicting evidence with reference to the bearings of coloured lights, as exemplified in our law courts, will, I think, sustain the latter statement."

So wrote Dr. Caldwell close upon twenty years ago, and it speaks volumes for the "diligence" which the Board of Trade has exercised over the subject that we, in the present year of grace, should still be urging the adoption of remedial measures to safeguard the public from dangers which were so pertinently indicated so far back as 1876.

Apparently the Board of Trade take credit to themselves concerning the Royal Society's enquiry into the colour-vision question. It is well-known, however, that it was only after steady pressure, long continued, that such a step was practically forced upon the Board of Trade. The enquiry was a costly one, and its findings were quite in accord with the latest scientific teachings. But the Board of Trade, if we except their adoption of the Holmgren wool test, have done but little towards adopting the Royal Society's recommendations. Their action in thus seeking advice, and then failing to act upon it, is clearly evidential that the enquiry was wrung from them with the greatest reluctance. They were practically compelled by the influence of public opinion to order it, and their subsequent neglect of its suggestions lays the Board of Trade open to the very serious charge of regarding the commission in the nature of a sop, which the united forces of the medical profession and the press compelled them to throw to the Cerberus of public opinion.

The official position on the subject of colour-blindness and its risks is the illogical one which assumes the absence of risk, because among the direct causes of collision definite cases of the disaster being due to colour-blindness or to defective eyesight, do not largely figure.

"It was certainly very remarkable," said Mr. Bryce, "that an exceedingly small number of accidents, he might almost say, few or no accidents, at sea or on land had been so far traceable to this cause. He had, for some months past, carefully perused the reports of the courts of enquiry, and he had made most careful enquiries of the heads of the railway and marine departments, and had been assured that in scarcely any case had it been suggested, or so far as they knew could it be suggested, that defects of vision had been the cause of accidents."

This is the buttress behind which officialdom shelters itself. The Board of Trade requires that death and disaster shall first take place before they will take the necessary steps to eliminate colour-blind and defective far-sighted subjects from occupying responsible positions on the decks and bridges of our merchant vessels. Mr Bryce, instead of perusing the reports he alludes to for months, might do so for years—for a lifetime, in fact—and not find a single case in which the court finds that a vessel has been lost through the defective sight of some member of its or another vessel's crew. But, if Mr. Bryce will deign to peruse the reports in question with an impartial mind, first dismissing the official view that the risk from colour-blindness and defective vision is a mere bogey, raised by the medical profession and believed in by the press, he will have but little difficulty in learning that many collisions occuring at sea by night are of an altogether unaccountable character. The atmosphere may be clear, the respective lookouts alert, so that the approaching vessels are duly signalled and reported before the danger point is reached. In spite of this, collision occurs. Through what cause? The Board of Trade maintain the cause may be anything save and except colour-blindness or defective sight. The preconceived official view is that visual defect quite precludes any suspicion that the disaster was due to such a factor. Common sense would say, why in such cases is not the eyesight of the survivors of such catastrophes tested? Why, too, in cases where there is a glaring contradiction on matters of fact respecting the position of converging vessels, as manifested by their sidelights, does not the court insist upon the eyesight of the witnesses being tested? If such steps were taken I venture to assert that many an inexplicable disaster would be solved, and many an apparent case of wilful perjury would be explained.

I challenge Mr. Bryce and the Board of Trade to point to one single case out of the many thousands that have occurred, where, after collision, the Board have ordered an examination of the eyesight of the surviving officers and lookouts, and I submit that Mr. Bryce's misleading—not to use a stronger adjective—reply, was not of the kind to be expected from the responsible minister of a great public department. Rightly or wrongly. I felt at the time that his reply was an evasion of the positive evidence laid before him, and was directed towards screening the permanent officials from the charge of apathy and negligence. Unquestionably it deceived—with a few notable exceptions—the public press, and not for the first time was the public gulled into a false feeling of security. Little did I think such a striking proof of their negligence and incapacity would be so soon forthcoming.

It might have been thought that the somewhat inexplicable cause of the "Elbe" and "Crathie" disaster would have suggested to the Board of Trade officials the advisibility of testing the eyesight and colour-sense of the "Crathie's" lookout men. Apart, however, from the utter improbability of themselves deeming it advisable to sift this phase of the question, they even refused to do so when asked.

Thinking that in such a lamentable catastrophe as this, no stone should be left unturned in the endeavour to trace to its true source the cause of the disaster, I wrote to the Board of Trade while their enquiry was pending, suggesting the desirability of examining the eyesight and colour-sense of such of the "Crathie's" crew as were on deck at the time of the casualty.

In response to my letter, I received from the Board of Trade an autograph communication of which the following is a copy:

Board of Trade, Whitehall Gardens, S. W.,
May 20th, 1895.

Dear Sir,

I am directed by Mr. Bryce to acknowledge receipt of your letter of yesterday's date, and to state in reply that the question of the powers of vision will be carefully borne in mind in the Board of Trade enquiry into the cause of the collision between the "Elbe" and "Crathie."

Yours faithfully,
(Signed) GARNHAM ROPER.

A perusal of the above letter clearly conveys the impression that the Board of Trade intended, or rather stated their intention, of examining the eyesight of the "Crathie's" lookouts. The enquiry, however, was duly held as announced, but the question of defective sight not being mentioned in the full reports appearing in the "Times," I therefore wrote again to the Board of Trade asking for a definite statement of fact as to whether these lookouts had actually been examined or no. In reply I was honoured with the accompanying:—

Board of Trade Marine Department,
7, Whitehall Gardens, *June 26th, 1895.*

Sir,

With reference to your letter of the 19th inst., asking whether the lookouts of the "Crathie" were examined as to their eyesight, and whether you can obtain a copy of the evidence taken, I am directed by the Board of Trade to state that the witnesses were not examined as to their eyesight, and that the evidence of both sides showed that colour-blindness had nothing to do with the cause of the collision.

I am, Sir,
Your obedient servant,
(Signed) INGRAM B. WALKER.

Colour-blindness or defective vision may or may not have had something to do with the disaster. But I maintain most emphatically that considering the awful nature of the catastrophe, and the unsatisfactory nature of the evidence forthcoming, that the Board of Trade should have tested the eyesight of the "Crathie's" lookouts, and that, in the face of these letters, their failure to do so constitutes a most serious dereliction of duty, and one which imperatively calls for Parliamentary action.

So much for Board of Trade persistency in escaping by any and every loophole from admitting that defective sight or colour-vision *may* be productive of maritime disaster.

A few words now on the subject of the Board of Trade's present regulations as to the proper time when the tests for colour-blindness or defective sight should be applied. Instead of being enforced before the articles of indentures are signed—and this is the proper moment—the tests only become compulsory on a candidate applying for a certificate of mate. They are thus only applied after a tedious apprenticeship has been completed, and when the candidate has, by following the sea, unfitted himself for success in other walks of life. What are the rejected ones to do? Stay on shore and starve or go to sea? The public have an idea that the Board of Trade tests eliminate the visually imperfect from our Mercantile Marine. But is that so? The following letter shows that the only course open to the rejected is to go to sea, colour-blindness or defective sight notwithstanding.

It is the letter of a hardworking, sober, and industrious young fellow, a life-long total abstainer, one who would, under kinder circumstances have become an ornament of his profession.

Failing, after being rejected for colour-blindness, to get a berth on shore, even at the paltry pittance of one pound per week, he was literally compelled to go to sea as an A.B., at a wage of £3 10s. per month. But let him state his own case:—

"I signed my indentures on 28th of December, 1887, to Mr. S. J., Liverpool, for four years. I joined my ship at Cardiff, 1st January, 1888, and finished my term of apprenticeship. I was also nine months over my time in the same vessel as A. B. On arriving home I went to school to coach for second mate. I put in my papers 14th October, 1892 (Friday) and was told I was colour-blind. At the advice of my late Captain I took a short trip up the Mediterranean in a steamer belonging to Messrs. L. (the voyage occupying a month). Again my sight was tested and was failed in the "green," but was told my sight in other colours was perfect. There was no hope for me to pass my examination, but at the same time there was nothing to prevent me going before the mast. I went away then in one of the . . . . . Company's Royal Mail Steamers in which I have been seven voyages to S . . . . . . During these voyages I have never had any complaints as to my ability to keep a proper lookout. This I did in a fast steamer for over two years. In conclusion I may state that my only prospect now is to continue as A.B. for the rest of my days." (Signed) E. B.W.

By the courtesy of J. Clark Hall, Esq., Registrar-General of Shipping and Seamen, I hold in my hands the returns of those men failing to comply with the colour-blind and eyesight tests, from September 1st, 1894—when the new tests came into force—to July 25th, 1895. The numbers are truly appalling. No less than seventy-six failed on account of colour-blindness, and eighty-nine for defective sight. Think for a few moments of what this means! Who can form the faintest conception of the depth of blank despair into which these poor fellows are plunged in an instant—victims of the crass ignorance, pride, and hardness of heart of gentlemen who, whatever they may be in private life, exhibit in their public capacity a callousness which cannot be surpassed, if paralleled throughout the length and breadth of the land. I have seen men, strong in the pride of manhood, men who would face any danger, and who are a credit to any nation, utterly broken down on hearing that their positions and livelihood—secure at one moment—are, through no fault of their own, swept away at the next.

For many years past we have told the Board of Trade that their adoption of imperfect tests and regulations has, by permitting the entry of colour-blinds into the service, constituted a serious double offense. By such laxity, not only have incompetent men been foisted upon the public as competent ones, but the inhuman procedure has been followed of granting certificates of competency which, on the introduction of reliable tests, would be rendered valueless to the possessor, and would consequently entail loss of occupation, or, in other words, ruin.

This constitutes a serious blot on the fair fame of our Government. We have recently witnessed the effect of an attempt to despoil the Church of her own, and have observed the result of an offort to deprive the publican of his license without compensation. These bodies, however, being rich and powerful, have resisted the attempt, and the public voice has upheld their objection. But infinitely harder and more pitable is the lot of the colour-blind officer. He has neither riches, influence, nor even a Parliamentary vote at his command; no redress is open to him—his only course is to quietly submit without even an opportunity of protest, and he is consequently plunged into the depths of despair.

The present Government has a clean page before it. Humanity demands, and a sense of right dictates, that these poor men be not cast adrift. Their names and addresses are known to the Board of Trade. Let Government see that, at the earliest opportunity, shore berths in Government Offices be offered to them, and thus in some measure they may be compensated for that loss of position and means of livelihood which, through no fault of their own, has unfortunately fallen to their lot.

If I am thought to be exaggerating the distress entailed, the recital of the following cases will carry conviction, where, perhaps, my mere statement would fail.

I have already recorded the case of Captain Smith who, after being at sea for twenty years, and in the possession of a Board of Trade's Master's Certificate, was accidently found to be colour-blind and was dismissed his ship. The ruin of his hopes and home (he was married and had three children) so preyed upon his mind that, though up to that time he had never had a day's illness, nor consulted a doctor, his health gradually gave way, and his death occurred in a little over twelve months after his dismissal.

A still more distressing illustration is to be found in the case of Captain F., who in April 1895, was discovered, also accidentally, to be colour-blind. A quotation from a letter received from the House Surgeon of the institution in which he was an inmate, as a result of attempted suicide, will best describe his condition. "Early in this year the patient's certificate was endorsed 'Colour-Blind,' in consequence of which he has been thrown out of employment. This has preyed upon his mind. He became sleepless and unsettled, and eventually tried to do away with himself by leaping into one of the docks. During his stay in hospital he was observed to be very melancholic, apparently taking no interest in his surroundings, and quite hopeless as to his future."

The bitter pathos of despair embodied in the above illustrations would be hard to parallel. Humanity and justice alike ask why the Board of Trade do not institute their tests so as to preclude a colour-blind or weak-sighted lad from embarking upon a sailor's life. The Medical Profession have long asked this question, the Shipping and General Press have long urged it, and what is even more reflecting upon the criminal ineptitude of the Board of Trade, the Committee appointed by the Royal Society and paid out of the public funds for the express purpose of considering this very subject made it one of, if not, their most important recommendation. Why should the Board of Trade seek costly advice and then not act upon it? How long will the British nation tamely submit to such a manifestation of wilful perversity?

Their examiners can produce many such harrowing cases of a life of promise blasted as the above; still the evil is unremedied although the means is so easily available.

There is, too, another aspect of the question. The sight examiners have to test candidates' knowledge of seamanship and navigation as well, and the new visual tests appropriate a great deal of time and entail much clerical work. The duties of the examiners are thus vastly increased. The work must be got through, however, and it is open to question if some section or other of the examination scheme does not suffer in consequence. On this ground alone, if on no other, a strong case is made out for expert examination. It is not the first time, by a long way, that the Board of Trade have been similarly indicted upon this same question. The matter is one of national importance, rather than one which calls for the intervention of the medical profession alone. What is to be done to bring the Board of Trade to its senses? It is little use interviewing the President of the Board of Trade, if like Mr. Bryce he is content to allow the officials of his department to continue the time-honoured but criminal policy of refusing amendment. By such methods we may even do harm, for the press and public are bound to pay more heed to his reply than to the statement of our case. What then is to be done to make the British nation insist that the Board of Trade shall adopt a humane, an enlightened, and a less criminally stupid policy over this important question?

IDENTICAL RETINAL IMPRESSIONS ON CORRESPONDING POINTS NOT NECESSARY FOR BINOCULAR SINGLE VISION.

By F. B. EATON, M. D., Portland, Ore.

Professor of Ophthalmology and Otology Medical Department, University of Oregon.

Several articles, some in favor, others opposing the theory of so-called compensatory action of the oblique muscles in oblique astigmatism, of which the late Dr. Culbertson[1] was the real father, would not, perhaps, repay perusal by most ophthalmologists, and refutation of the theory be of no practical importance, were not therapeutic measures founded upon it by its advocates, and some unreflecting readers influenced thereby. Arguments pro and con have been based upon photographic pictures made with the ordinary camera, the construction of which is similar in some respects to the form and mechanism of the eye,[2] but nevertheless differs strikingly in one regard not referred to by the writers of these articles, in that the ground glass on which the image is formed, unlike the retina, presents a flat, instead of a concave spherical surface. I invite the attention of the advocates of the theory of this fact, which will probably explain the occurrence of binocular metamorphopsia in emmetropes when certain lenses are before the eyes.

"The phenomena (of metamorphopsia) are not rare, not even comparatively rare. On the contrary they are to be seen in all cases of anisometropia with binocular single vision, with exceptions. The existence of astigmatic defect is not a sine qua non, although the phenomena are especially noticeable in cases of

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1. Jour. Amer. Med. Asso., November, 1888.
2. Jour. Ophth. Otol. and Laryn., 1895. Ophth. Record, August, 1895.

astigmatism of one or both eyes, in which the chief meridians are oblique.[3]"

Even some of the evidence adduced in favor of the theory affords proof of its falsity. Thus the photographs, Nos. 3 and 5, of a rectangle as seen by a cylinder with its axis vertical and horizontal, and illustrating the paper of Dr. Lowry,[4] show unmistakable distortion of the vertical sides of the image.

But beyond and superior to the above quoted reasons for giving no practical weight to the persistent and forced advocacy of this untenable theory, is that contained in the following passages in Hering's *Lehre vom Binocularen Sehen.* I commend it to those who fancy they see the images produced by oblique-angled cylinders, as seen in the camera, an analogy to those formed on the retina in oblique astigmatism as seen by the brain, for we do not see in reality with the eye, but with the brain:

"The physical laws, according to which the image of objects lying excentrically are projected upon both retinæ, necessarily involve the fact that binocular single vision cannot be connected with identical impressions on corresponding points of both retinæ. If this were the case, only those points in the visual field could be seen singly, which lie in certain lines and surfaces through the point of fixation. But this contradicts common experience and the results of more exact physiological investigation, and it is especially disproved by the optical effect of the stereoscope. We can only say that binocular single vision of corresponding portions of the two retinæ actually occurs, that it is to some extent obligatory, since no kind of practice, or artificial assistance, renders it possible to see the two simultaneous irritations of such points at the same time, separated, near or behind each other. We may also say that the power of the single sensation extends to *different* parts of both retinæ, and may here be called *facultative*, since practice and all kinds of artificial assistance cause an object originally seen single to appear separated into two false images. Still more; single vision with disconsonant retinal positions is one of the requirements for the solid vision of objects.[5]"

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[3] Archiv. Ophth., Vol. XVIII.

[4] Ophth. Record, August, 1895.

To the present champion of the new theory, whose elaborate diagrams of the retinal images in oblique astigmatism appear to be the points de resistance of his theoretical edifice, the above quotations are especially commended.—*Annals of Ophthal. and Otol., October, 1895.*

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[5] Die Lehre vom Binocularem Sehen., Leipzig, 1868

ROTATION IN OBLIQUE ASTIGMATISM

By C. H. PERRY, M.D., Oneida, N. Y.

The experiments described below were made to determine whether adjustment for binocular vision in symmetrical oblique astigmatism involves a movement of rotation on the visual axis.

It is intended to show experimentally: first, that an astigmatic lens or dioptric system so distorts the visual image as to deflect radial lines on opposite sides of its axis, in contrary directions; second, that when such images are formed on the retinæ of a pair of symmetrically oblique astigmatic eyes, rotation takes place in the direction required to carry corresponding parts of each retina to correlative points in the image.*

Fig. 1, was produced by taking a photograph of the graduated circle with printed words as shown, and then, without moving camera or object, placing a 50 D. cylindrical lens in front of the objective and exposing a second negative, and when the photographs were finished, cutting away the outer circle from the astigmatic print and pasting it over the other in such a way

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*Read before the Madison County (N. Y.) Medical Society, Nov. 12, 1895

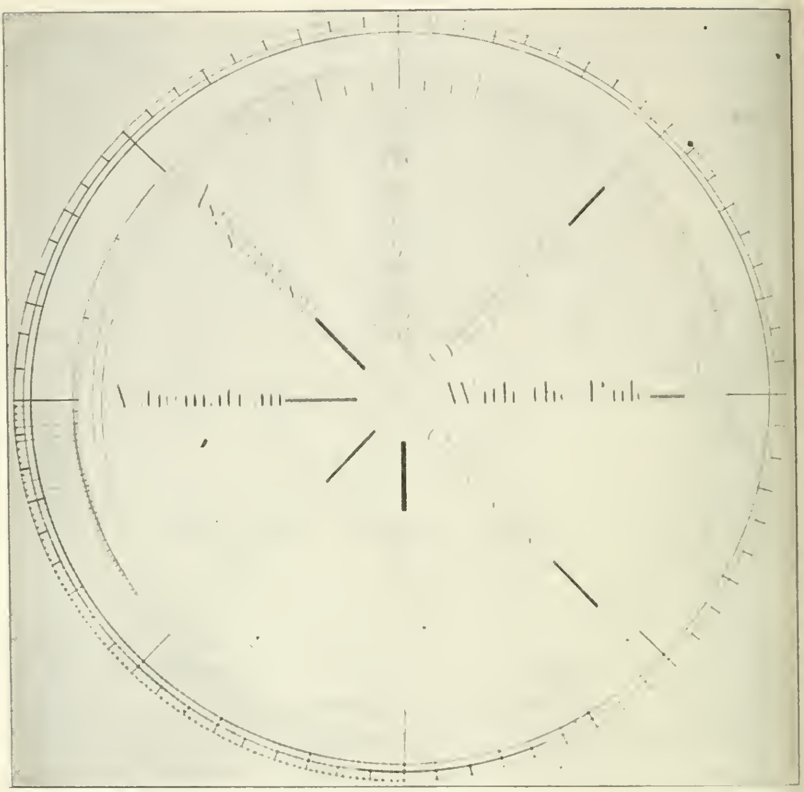

FIGURE 1.

as to make the horizontal and vertical lines respectively coincide on the two prints. If the cut is held so that the line of the print reading "Astigmatism Oblique 135°" is horizontal, it will be observed that the distortion of the field is such that this particular line is moved along the scale nearly two degrees, while the line that is perpendicular to it is moved an equal distance, but in a contrary direction. This shows what must happen to a retinal image in oblique astigmatism.

Fig. 2, Represents a stereoscopic card to which are centrally pivoted two thin disks, each three inches in diameter, their centers being three inches apart in a horizontal line.

These disks are mashed together at their point of contact, by a single interlocking slot in each.

The left disk is moved by a lever passing under the right, and is provided with an index, which shows on a graduated scale at the right hand of the card, the number of degrees that each disk is rotated. Having equal diameters and being geared together they move synchronously equal distances, but in opposite directions. Horizontally over the center of each disk is printed a word, and vertically through each of said centers is drawn a line.

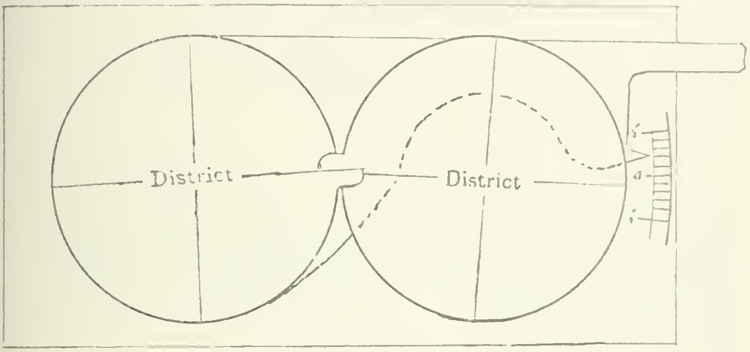

FIGURE 2.

When this apparatus is seen in a stereoscope and the disks are rotated by moving the lever, the two words will remain blended while each disk moves through an arc of about 5° (and much more in some subjects); and if attention is given to the perpendicular lines, they will appear as a single line during the rotation of about the same arc. If used with due care, this instrument gives a practically accurate measurement, not only of the relative, but of the absolute power of rotation in each direction.

To make the concluding part of this experiment, the card must be immovably secured to the stereoscope, which should be rigidly fixed to a table or stand provided with a chin rest: and while the subject of the experiment is looking at the words, an assistant should, by moving the lever, rotate the disk about 5 back and forth; that is, carry the index about $2\frac{1}{2}°$ above, then $2\frac{1}{2}°$ below the point marked 0 on the scale. During this rotation, if the operator observes the ophthalmoscopic erect image of a vessel on the nasal side of the retina, he will see it move downward over the field of the pupil as the upper edges of the disks are rotating outward, and upward when they are rotating inward.

If the subject of the experiment now gives his attention to the vertical lines, the vessel is seen to move up when the disks are rotating outward, and down when they are rotating inward; that is in a direction opposite to that seen when the word or horizontal line is observed. If a conjunctival vessel is observed with a microscope, under the same conditions, no decided motion can be seen.

The facts demonstrated by the first of the above described experiments have been proven in a variety of ways, the result of the demonstration by geometrical optics being unquestionable, but, so far as the writer is informed, the direct observation of the rotary movement of the eyeball under the conditions stated is not on record.

MUSCLE SHORTENING.*

By FRANCIS VALK, M. D., New York

The question now being the manner of advancement or shortening the externus; or, if a divergent squint, of the internus. I have lately modified the operation, by which I "take a tuck," as it were, in the muscle to be shortened and do not cut it loose from its attachments.

This operation is performed as follows: Deciding upon the muscle to be shortened, I make a horizontal incision in the con-

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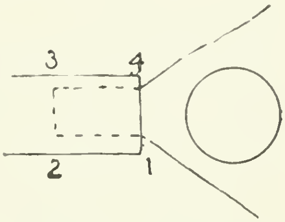
*This description (an abstract) is taken from the *Post-Graduate*, July, 1895.

junctiva, over the insertion and muscular fibres, and expose the muscles freely with two strabismus hooks. I then take a small curved needle, armed with No. 00 fine catgut suture, sterilized, and pass the needle through the lower part of the tendon, close to the sclerotic. As the needle comes out beneath the tendon it is again taken to the holder and carried backward beneath the belly of the muscles, and brought out from within outward; I then carry it across the muscle above, and at an opposite point to the last puncture, the needle is passed through the muscle from without, inward, then carried back to the tendon and beneath it, the needle comes out through the tendon, above the first puncture and is drawn through and cut off. As the suture is drawn tense, we will now find it in this position:



The manner of passing the suture is shown by the numbers.

We may now tenotomize the opposing muscle, if necessary, and then proceed to tie the suture. This is done by taking the two ends and tying them with a surgical knot over the tendon, and as it is drawn tight the muscle is shortened with the enclosed part of the muscle drawn up in a fold "*like a tuck.*" When sufficiently shortened, so that the position of the cornea is correct, we must complete the tie and closely cut off the ends. We now close the wound in the conjunctiva by a small black silk suture, if necessary, and leave the catgut suture to be absorbed, as there will be no necessity for its removal and very little reaction afterward.

I have also found this method of shortening very useful in slight cases of paresis of the muscles with diplopia.

It is not necessary to recite the cases in which I have used this method of shortening the straight muscles of the eye, as they have been shown in my clinic at the Post-Graduate Hospital. I will only state that I have used this method a number of times, and am very much pleased with the final results, while any reaction has been very slight.

It is particularly recommended in cases of heterophoria, slight paresis, and in the first class of cases of strabismus, as by this method we can at once obtain perfect and final parallelism of the visual lines, and by an operation on the amplyopic eye alone.

New York, August 15, 1895.

Dr. G. C. Savage,

Dear Doctor: Your letter just received. I looked up the editorial you refer to, in Record, Nov. '93, and now have no doubt that you are fully entitled to the credit of, what seems to be, an excellent operation.

So I have written to the *Post-Graduate* at once, asking them to make the correction, and shall look for it in the next issue in September, as your letter to me here came too late for the August number. The idea was original with myself as you will see. I pass the suture differently from yours and use the catgut suture to be absorbed, and at the time of my operation I had no remembrance of having seen your excellent editorial.

But it is very evident to me that you have the prior right to the method of shortening the muscles, and I will gladly do all I can to correct the matter, and should I refer to it again, will always give you credit for it. There is an old saying "Nothing new, etc.," and it seems so in this case. I have been delighted with my success by this simple procedure, and hope some day we may meet and talk this and other matters over.

Sincerely yours, Francis Valk, M. D.

N. B.—You may publish this if you so wish. V.

MUSCLE ADVANCEMENT, AS DONE BY DR. GEORGE T. STEVENS, OF NEW YORK.

"We begin in this operation, as in that for tenotomy, by making a transverse slit of a millimetre in extent over the point of insertion of the tendon. Then, lifting the border of the conjunctiva nearest the cornea by the fine forceps, a little pocket is made by the points of the scissors or the lance probe, extending under the conjunctiva more or less toward the cornea in proportion to the greater or less effect which we propose to induce. The pocket having been made, the forceps seize the central portion of the tendon and it is dissected from the eyeball entirely or partially, as the case may be. If it is entirely dissected, then, by means of the scissors point acting as a probe or by means of the lance probe, the tendon should be absolutely freed from any attachment to the surrounding tissues. The fine tendon crotchet now catches it at the center and a little behind the section and draws it forward, or, if the hook proves to be ineffectual to hold it during the next stages of the operation, the fine fixation forceps with catch may be used. The tendon is drawn forward through the little conjunctival opening, when one of the needles from a thread of silk armed at each end with a needle is passed through the central part from a half to a full millimetre or even more, behind the cut extremity. Bringing the needle forward until the two extremities of this thread are about equal in length, an assistant carries the lance probe into the pocket already made, and one of the needles, passing by the side of this probe, which acts as a guide, is made to penetrate the conjunctiva at the extreme end of the pocket and the thread is drawn through. The other needle and its thread are managed in like manner, the second needle penetrating a little to one side of the first in order to allow between the two threads a little bridge of tissue Now, the assistant holding the conjunctiva at the border of the wound by means of fine forceps, the surgeon draws upon the ends of the thread, forcing the cut end of the tendon into the little pocket, and when he has thus advanced it to his satisfaction he fastens the threads by tying them across the little bridge.

"No cover and no special care is required beyond that needed for perfect cleanliness, and on the third or fourth day the suture may be removed. The greatest danger in these cases arises from the use by the patient of a soiled handkerchief with which he rubs the eye. Against this danger the strictest injunctions are to be enforced."

SCIENTIFIC PROCEEDINGS OF THE SECTION OF OPHTHALMOLOGY OF THE A. M. A.

Papers in abstract, discussions in full.

(*Continued from page 158, Current Volume.*)

A STUDY OF THE REFRACTION OF 1700 EYES.

By H. BERT. ELLIS, M.D., Los Angeles, Cal.

The question of refraction is one that plays no unimportant part in the daily work of many oculists in our large cities, and of most oculists in our medium and smaller cities. With many it forms the great bulk of their work.

I present for your consideration to-day, in tabular form, a study of the refraction of 1700 eyes, representing 869 patients taken from the last 1000 consecutive cases coming under the care of the writer in his private practice. Of the 131 cases not incorporated in this study, some were infants with various inflammatory troubles, and some, operative cases, five only being presbyopes with emmetropic eyes. Thus you will see that about 87% of all my eye cases required correction of ametropia. Dr Geo. M. Gould, in a paper on these very lines, read before this Section in 1891, said that 93% of his eye patients required correction of errors of refraction. If, therefore, from 85% to 95% of all eyes that come under the oculist's care need errors of refraction corrected, it will be wise for all of us to give the subject some little consideration.

Of the 869 patients whose eyes form the basis of this study, 613 (70%) were females, and 256 (about 30%) males, a proportion of nearly 2½ to 1. The same general laws underlie this disproportion between the sexes in ophthalmological practice, that cause a similar disproportion of males and females in other branches of medical work: *e. g.*, among the women we find less general vigor; less active life, with closer confinement; more constant and finer work in the application of the eyes: and last but not least, a more sensitive and high-strung nervous mechanism.

Although 19% of the patients were presbyopic, no account is taken of the presbyopia in these tables. In 66% of the patients under 40 a mydriatic was used: ordinarily I employed ophthalmic discs composed of homatropine and cocaine, of each 1 50 gr., to produce mydriasis. Where the use of three or four of these discs in each eye within a period of one and a half hours failed to quiet accommodation, I used a few drops of an atropine solution, four grains to the ounce, in each eye four times daily for three days. I have, however, had but few cases in which I have had to resort to this method. I have left out of this study all aphakic eyes, and all eyes in which disease of the refracting media or fundus had impaired refraction. In the preparation of tables I followed the same general plan adopted by Dr. Gould in his paper of four years ago.

I have in table I, given the general refraction of 1700 eyes. 1371 or a little over 80% were hyperopic; 282, 16.59% myopic; while 47 were myopic in one meridian and hyperopic in the other. Of my hyperopic cases I found only 16% with simple hyperopia, 84% had astigmatism simple or compound, the simple astigmatism amounting to 37% of all the hypermetropia. Among the myopic patients we find very nearly the same proportion, 17% of simple myopia, 32% of simple myopic astigmatism and 51% of myopia with myopic astigmatism.

Table II, gives the amount of hyperopic correction in 867 eyes, but does not include the astigmatism. It will be noted that 42% of the eyes had hyperopia of 0.50 D. or less, and 81% had less than 1.75 D. The eyes having hyperopia combined with astigmatism outnumbered the simple hyperopic eyes more than 3 to 1. Although the table shows so large a number of eyes with small hyperopic errors, it must not be supposed the total error was correspondingly small, because with small amounts of hyperopia, I frequently found large amounts of astigmatism.

Myopia is classified in table III. In comparison with the hyperopic table, we find only 31% of the eyes have errors of 0.50 D or less, against 42% of the hyperopic eyes; and 62% against 81% with errors less than 1.75 D. On the other hand, it will be seen that over 21% of the myopic eyes have shown between 5.50 D and 22 D of error, while less than 2% of the hypermetropic eyes had corresponding errors.

Of the 1700 eyes whose refraction was measured, 1434 were astigmatic, but in 47 of these the astigmatism was mixed, and I have consequently given them a table by themselves. The varying amounts of astigmatism in the remaining 1387 eyes is given in table IV. 1158 of the eyes, 83% had hypermetropic astigmatism. In 72% of all the astigmatic eyes the error was less than 0.75 D. while 92% of the eyes had errors less than 1.75 D. 494 of the eyes had only 0.25 D of astigmatism and yet I found it both wise and expedient to correct the greater number of these small errors. As we would naturally expect, we find relatively a larger number of small degrees of hyperopic astigmatism, and proportionately large errors of myopic astigmatism; for instance, 20% of the myopic astigmatic eyes had errors above 2 D while only 3% of the hyperopic astigmatic eyes had correspondingly large errors.

The axes of the 1434 astigmatic eyes are classified in table V. I have used the term unsymmetrical in a somewhat narrow sense and not with its usual significance. In table V, unsymmetrical simply means the departure of the axis of any given eye from 90° or 180° without reference to the axis of its fellow, excepting where the axis of the pair are symmetrical. Under axis 90° I have included every eye having its axes so placed irrespective of the fact of the fellow eye having no astigmatism or the axis at 180° or some oblique angle; and similarly all axes at 180° are placed together. 55% of all astigmatic eyes had their axes at 90°, while 25% had them at 180°, leaving only 20% with oblique axes. Among the hyperopic astigmatic eyes 62% were according to the rule at 90° and 20% contrary to rule at 180°; while in the myopic table only 51% are according to rule at 180° and 24% against the rule at 90°. The unsymmetrical cases were relatively more numerous among the myopes.

The unsymmetrical axes of those varying from 90° and 180° are grouped in table VII, and it will be seen that, among the hyperopic eyes, 49% of the unsymmetrical eyes had their fellow eyes with astigmatism at 90°, and 12% at 180°; and in the myopic division, 9% had fellow axis at 90°, while 21% had them at 180°. Of the 201 unsymmetrical eyes, 52% have the axis of the fellow eye at 90° or 180°. In studying the deviation of the axes from 90° and 180° I find no definite rule, but simply a tendency of the hyperopic axes to be near 90°; and of the myopic axes to depart but little from the horizontal diameter. For instance, 36 of the hyperopic astigmatic eyes had their chief diameter at 75°; 24 at 105°; 13 at 60°, and 17 at 20°. 70% of these hyperopic variations diverged within 30° of the perpendicular diameter on either side. In the myopic variations, 6 were at 165°; 7 at 150°; 7 at 15°, and 12 at 30°, while 65% were within 30° of the horizontal diameter, which is in accord with the ordinary teaching. In table V, the axes of all my astigmatic cases were given; but in table IV, the refraction of 47 eyes, the mixed astigmatic cases, was omitted. The refraction of these 47 eyes, expressed in terms of crossed cylinders, is given in a table by itself. We have, however, no particular lesson to draw from it, or point of interest to call to your attention, excepting a fact, which the table itself does not show, and that is, that it required but weak glasses to make the correction in the greater number of those eyes.

In tables VIII and IX are given respectively, tabulated statements of "Ocular Reflexes" and "Reflex Neuroses of Possible Ocular Origin" occuring in the 869 cases of refraction which this paper includes. That table VII shows a total of 1467 cases is explained by the fact that two or more of the symptoms frequently occured in the same individual. Distress from reflected light, I find to be the most common ocular reflex complained of, while aching or pain in the eye was not unfrequently mentioned, and blepharospasm and blepharitis were quite common. There were 97 cases of marked conjunctivitis and 78 cases of excessive lachrymation. Of the symtoms in the Reflex Neuroses of *Possible* Ocular Origin, I can only say I have emphasized possible and will only add that they existed singly, in pairs and sometimes in toto, but to say that they all arose from eye strain is far beyond my desire. That many of them were of ocular origin I have but little doubt, and this is especially so in regard to the headaches which existed in 527 cases, about 60% of the patients. All headaches are not of ocular origin; errors of refraction uncorrected do not always produce headaches, but having found an error of refraction with headaches, especially of the fronto-temporal variety following the use of the eyes, we have not room to doubt the wisdom of correcting the error. The variety of headache finds its classification in table X. The fronto-temporal is by far the most common variety, occuring in 40% of all headaches. Frontal, becoming occipital, is found in 16% of the headaches complained of and the primary occipital occurs in 11% of the cases.

It will be noted that reflected light forms a very large percentage of complaints among the ocular reflexes. This is without doubt a greater factor with us in Southern California, than in the other parts of the United States, accounted for by the fact that we have very white roads and streets accompanied by about 300 bright, sunshiny days each year. When correction of the error of refraction fails to relieve this distressing symptom, I have found that greater relief is given by light blue, than London smoked glasses.

SYMMETRICAL AND ASYMMETRICAL MERIDIANS OF THE CORNEA IN ASTIGMATIC EYES.

By S. D. RISLEY, M.D., and JAMES THORINGTON, M.D., Philadelphia.

Much practical interest attaches to the symmetrical and asymmetrical direction of the principal meridians of corneal curvature in astigmatic eyes. My attention has been directed anew to the subject by the interesting papers of Drs. Knapp and Harlan, (Trans. Am. Oph. Soc. 1894.) and by some recent studies of the relation of asymmetrical meridians in the cornea and different grades of refraction error in the two eyes to cases of abnormality of ocular balance. (University Med. Mag. Jan. 1895) That these asymmetrical conditions give rise to more severe forms of asthenopia cannot be questioned, and we have repeatedly brought forward statistics to show that emmetropia must be regarded as the standard refraction for the model eye since emmetropic eyes and those which most nearly approximate this ideal state of refraction, bear the requirements of civilized life with a minimum of discomfort or peril. If this is true, eyes which do not conform to this standard are to be regarded as anatomically defective. It is a curious fact that these congenitally defective eyes should, in so large a percentage of cases, seem to fall under the operation of some law of symmetry. It has long been observed that in a large percentage of astigmatic eyes the meridian of shortest radius for each eye is either directly vertical, i. e., 90° from a horizontal line, or symmetrically disposed to the vertical axis of the body. Knapp found this to be the case in 34%, and Harlan in 70.14%. This fact awakens the most interesting inquiry regarding the anatomical conditions which determine it, and also as to those which give rise to the very frequent variations. Any satisfactory answer, however, to such inquiries is extremely difficult to obtain.

Observations of certain anomalous conditions which obtain in cases of high anisometropia with high grades of asymmetrical astigmatism seem to justify the belief that the form of the eyeball is, in a great measure, determined by the size of the orbits, and that the orbits are in turn modified in their various diameters by the abnormalities in the form of the skull. It is obviously difficult to secure the required data as to the form of the eyeballs in any given series and to subsequently measure diameters of the orbits in the same individuals, but, a cursory inspection of a small number of dried skulls has shown no great variation in the measurements of the diameters of the orbits and that these variations were only a part of certain well defined deformities in the diameters of the skull, and that the abnormalities in the orbits were associated with anomalous conditions in the bones of the face and nasal fossa. The purpose of the present study was to show to what extent these anomalous forms found expression in asymmetrical conditions in the direction of the principal meridians of curvature as expressed in astigmatic eyes. The present paper presents but one phase of the subject. I have observed in a number of patients presenting a wide difference of refraction in the two eyes with high astigmatism in one and much lower in the other, and with asymmetrical meridians, that the condition was associated with a well marked difference in the two sides of the face. In a few instances the general deformity of the skull could be demonstrated by the hatter's form. While the relation between these conditions and the ocular anomaly may seem quite obvious in cases of deformity, it is more difficult to demonstrate any association in minor degrees of error, nevertheless, they suggest not only the probable etiology of the astigmatic eye and its asymmetries, but also suggest the probable origion of many cases of absolute abnormality in the ocular balance and define the limits of possible relief from treatment by surgical or other procedure.

The following tables are based upon the analysis of 2,500 pairs of defective eyes, 1,300 of which are from the records in my private case books, and 1,200 from the Wills Hospital records. In both the cases they were taken without selection in the reverse order of application for treatment. The corrections were all made with the eyes under the full influence of a cycloplegia, the design being to ascertain as accurately as possible the static refraction of each eye in every case. To this end the ultimate test was the subjective examination, but this was, almost without exception, aidedby the employment of the ophthalmometer of Javal and Schiotz, and the shadow test, one or both. In private records, in a large number of cases, both were used, while in the hospital cases the shadow test was employed almost without exception. The two records are kept separate in the tables to show the importance of great care in determining the refraction of eyes. In the haste which it is necessary to observe in the clinic room where a limited time must be given to the correction of a large number of patients, it is not possible to give the pains-taking care that can be given during the longer time devoted to work in the private office. The result of this greater care to absolutely reduce every eye to the optical basis of emmetropia is shown by the different results reached. Then in the public service it was not always deemed necessary to correct the eyes of those engaged in coarse labor with the same accuracy as would be observed in the case of those engaged in finer pursuits.

The analysis discloses the percentage of simple myopia and hypermetropia, of monocular and binocular astigmatism. In the latter group the symmetrical and asymmetrical direction of the meridians of shortest radius were carefully noted. The result is disclosed in the condensed tables, which have been prepared with great care by Dr. Thorington.

All cases are grouped as symmetrical where the combined value of the inclination of the meridians was 180 degrees of linear development on an arc, counting 0° on a horizontal line. Thus, if the meridian of shortest radius was at 90° in both eyes, at 60° on one side and 120° on the other, or at 75° and 105° respectively they were recorded as symmetrical, since the sum of their values is in each case 180° and so for any other inclination, e. g., 0° and 180° or 15° and 165° and so on. These symmetrical inclinations are divided into those according to rule (homologous astigmatism), i. e., where the shortest radius was at 90° or approximately so, and those against the rule (heterologous), that is to say, where the shortest radius was found at 0° or approximated the horizontal nearer than the vertical direction. The asymmetrical cases were also grouped according as the direction of the meridians approximated the vertical or horizontal direction. All cases where the combined values in degrees were greater or less than 180° are placed in these groups unless the meridians were at right angles. They were then placed in the group of *heteronomous* astigmatism. In the rare instances where the meridians were inclined from the vertical or horizontal, but were parallel to each other, they have been placed under the head of *homonomous* astigmatism. For example, if the axis of the correcting cylinder were required at 90° on one side and 75° or 60° or 120° on the other it will be found under the head of asymmetrical astigmatism against the rule. If at 0° and 150° respectively, it was placed under asymmetrical astigmatism against the rule. If at 0° and 90° respectivelv, the case fell under the category of heteronymous, whereas if both axes were required, for example at 60° or 120°, it was recorded as homonymous astigmatism.

LATENT ASTIGMATISM.

By HORACE M STARKEY, M. D., Chicago, Ill.

First: Latent astigmatism is a frequent and important cause of asthenopia.

Second: The latent astigmatism may in many cases be made manifest without a cycloplegic and without interfering with the patient's business, by giving lenses which correct the manifest error, which may be worn a day or two, when an additional amount of astigmatism will be manifest which may be corrected in the same way, and so on until the latent trouble is unmasked.

Third: This may be done without discomfort to the patient, and is therefore advantageous with the skeptical, the irritable and the nervous.

Fourth: Recent text-books do not give this subject the attention its importance deserves.

Fifth: Astigmatism may be latent whether the axis of greatest curvature is vertical, horizontal or diagonal.

Sixth: Cases are given illustrating the fore-going points.

ON THE LOCAL AND GENERAL CONDITIONS THAT CHANGE CORNEAL CURVATURES.

By LOUIS J. LAUTENBACH, A.M., M.D., PH.D. Philadelphia.
Surgeon to the Pennsylvania Eye and Ear Infirmary; Throat and Nose Physician to Odd Fellow's Home, etc. Late Chief of Eye and Ear Clinic, German Hospital.

Regular astigmatism is the result of various conflicting forces acting antagonistically on the corneal curvatures. If these and their relationships remain fixed the astigmatism, once created, will not vary, but should the conditions be changed or their relationships altered, the astigmatism will vary in degree, in axis, or in both directly proportionate to the extent of the variations.

The prenatal cornea is subjected to pressure from within and without. The corneal surface is the result of these opposing forces. The pressure from within the eye during the period of growth, stretches the tissues of the eyeball in all directions. In consequence of this the cornea being the densest and most rigid portion thereof, is subjected to the least change in curvature, but still having the radii of its curves increased, the support of the recti muscles and of the orbicularis still further opposes this flattening, the oblique muscles, and to a limited extent, the levator palpebræ, aiding it. Among the other influences working at this time, is the resistance offered laterally and posteriorly to the growth of the ball and to the play of the various forces above indicated, by the wall and contents of the orbital cavity. If the equatorial resistance of the orbit be greater than normal, the corneal curvatures will in consequence be increased, while, vice versa, if too much pressure be exerted from behind the eyeball, they will be decreased and the cornea flattened.

The corneal curvatures at birth are but the resultants of these conflicting forces, and through life these same factors play even as important a part in the retention or in the alteration of its curves, except that the forces applied are apt to be more irregular in their action, while the cornea having become fairly rigid and having assumed a more fixed and definite form, more strenuously opposes changes of all kinds whether applied from within or without the globe. The ciliary muscle later in life also plays a part in the retention and alteration of the corneal curves. When active it is prone to increase the curvature, and when passive to diminish it. All forms and varieties of astigmatism are the direct result of the action of these various influences, and from the degree and axes of the astigmatism, we can by careful study, determine the exact location of the supra and sub-normal forces.

Corneal changes are of two kinds—first, slow and regular, and second, sudden and variable. The former occuring in sound, healthy corneæ as the result of the constant over-action of some of these various conflicting elements, and the latter occuring in diseased or weakened corneæ.

In conclusion it may be said:

1st. That Regular Astigmatism is always Corneal or Lenticular, but usually the former.

2nd. That Regular Corneal Astigmatism is the result of a variety of forces acting upon the cornea, these forces being usually so accurately balanced that it results in the production of normal astigmatism, a low degree of astigmatism with the rule.

3rd. That these forces consist not only of the muscles of the eye and of the lids, but that the orbital resistance, the intraocular pressure, and even the ciliary muscle, are concerned, as well as the tonicity of the cornea.

4th. That anything that interferes in any way with the accurate balancing of these forces, results in the production of astigmatism, modified or altered in accordance with the excess or deficiency of the power exerted.

5th. That any local condition which interferes with the texture or nutrition of the corneæ predisposes to change in corneal axes and curvatures.

6th. That any constitutional affection in any way modifying the general circulation and thus changing the corneal nutrient supply, predisposes to these changes.

7th. That the inequality of forces when long continued affects healthy corneæ, giving rise to slow, regular, progressive changes in the axes or degree of astigmatism, or of both.

8th. That these unequal forces acting upon corneæ, weak from local or constitutional causes, produce more rapid and violent, often instantaneous changes in the axes or degree of astigmatism, or of both.

9th. That any force acting unduly on the cornea should have its action modified as soon as possible.

10th. That corneæ under the influence of unequal forces should be put at rest at the earliest possible moment.

11th. That corneæ, weak from general or local conditions, after being put at rest, should be promptly and efficiently treated in order to render them strong and healthy.

12th. That in many eye affections, a study of the corneal changes will serve to shed light on otherwise obscure conditions.

13th. That, by carefully studying these corneal curvatures changes in connection with the kind, degree and axis of astigmatism, indications for treatment of the eye muscles will be obtained that were otherwise impossible.

DISCUSSIONS.

DR. FRANK FISHER, Philadelphia: It is quite possible and even probable that the action of the ciliary muscle may assist in maintaining or producing changes in the corneal curvatures. That the extra ocular muscles effect or control to a great extent, the corneal curves, does not seem to be well borne out in my observation of eyes, subject to tenotomy of the recti. It has rarely been necessary to make re-correction for astigmatism after making such operation. In stating that the individual muscles may make immediate or permanent changes in corneal curves, it appears that the influence of the capsule of Tenon in equalizing all muscle pressure upon the sclera has been overlooked. So intimately must the influence of muscles and capsule be associated, and, that, too upon liquid contents of the eyeball that it appears improbable that one muscle should maintain a special or lasting impression upon the cornea. The whole subject, however, is worthy of deep and continued consideration as of vast interest in special study of refractive areas.

DR. EDWARD JACKSON, Philadelphia, Pa.: We must remember that primarily a purely physical phenomenon dependent on the form of the dioptric surfaces of the cornea which is determined by the resistance of the sclero-corneal coat varying at different points with its thickness, tension and nutrition. Only when we gain a better understanding of the influence of these factors, will we be prepared to understand the effect of physiologic and pathologic factors like muscular or inflammatory action. With regard to the changes that some have seen in the corneal astigmatism while observing it with the ophthalmometer, it is well known that the amount of astigmatism and the direction of its principal meridians, vary in different parts of the cornea. How can the observer satisfy himself that the change has actually occurred in the shape of a certain part of the cornea, and not that the patient has slightly changed the direction of the eye and the part of the cornea presented. I certainly think that a large proportion of patients are not sufficiently accurate observers for us to accept their testimony on this point. As to latent astigmatism, too, we must have more complete observations and testimony of a different order before we consider settled the frequency, or even existence of latent astigmatism.

Dr. A. C. Corr, Carlinville, Ill.: Dr. Ellis has said that he only found 2.7 per cent. of mixed astigmatism in 1,700 examinations of eyes otherwise in error. That very nearly corresponds with my own observations. I have only found two cases in 1,000 examinations. I find many cases of apparent mixed astigmatism on superficial examinations, but have resolved all but two, by midriasis, to some simple or compound variety.

When homatropine midriasis in the ordinary way will not resolve a case, I use atropia three times daily for several days. I have usually acted in this correction of astigmatism on the notion that the stastic refraction of the eye could only be astigmatic in one meridian, and that the dynamic was always responsible, that which made the case a mixed one; therefore that the midriasis ought to overcome it and usually I have found it so. Now as to the latent astigmatism as suggested by Dr. Starkey, I had thought differently. Usually in examining the eyes superficially I find the astigmatism first manifest, not always in its full degree, nor in its real variety. I call to mind one case that had, .75 D. myopic astigmatism in vertical meridian, on superficial examination, that was developed into a 3 .50 D. hypermetropic astigmatism in horizontal meridian, and a much improved vision and corresponding comfort.

Dr. P. D. Callan, New York: Dr. Starkey's frame was used twenty-three years ago by Professor Schnable, of Vienna, for the patient to alter the axis in order to get the best vision. Unfortunately we must be careful in accepting the testimony of a patient or we shall be deceived by their answers.

Dr. H. M. Starkey, Chicago, Ill.: In the first place I wish to disclaim any idea of calling the frames shown, "Starkey's." They are to be found in the stores of all opticians and are taken because of their convenience. Secondly, they were never used for the purpose of developing astigmatism. They were first used for trial in doubtful cases, to see if lenses worn a few days would relieve the symptoms of which the patient complained. In many cases where a small degree of astigmatism is present, it is doubtful if this is the cause of the asthenopia. The cylinders are given for trial a few days and not infrequently this trial convinces me that we must look further for the cause of the trouble. As these cases passed before me it was occasionally found that the glass worn was too weak and was replaced by a stronger, which in turn might become too weak. After noting a number of these cases I commenced in September last to make a memorandum of the fact that case so and so appears to have an increase in the amount of astigmatism; later these cases were collected and studied, and it was a surprise to find so many of them contrary to the rule. It is distinctly stated in the paper that the method is not ideal, and is not to be used habitually to determine the amount of astigmatism, but is only employed in those cases where paralysis of accommodation cannot for any cause be induced. The giving of glasses both spherical and cylindrical in this way is recommended in many cases even where a cycloplegic has been used, that the patient may gradually acquire the new relation between accommodation and convergence. As stated in the paper, the refraction is tested by lenses, the ophthalmoscope and the retinoscope at the first trial, and sometimes the latter indicates more astigmatism than the patient will allow us to correct, while in others the retinoscope indicated but .25 D. of astigmatism at first but later corresponded with the other tests of .62 D. astigmatism. Doubt has been expressed as to the actual occurence of latent astigmatism, and another speaker has said that he cannot see how latent astigmatism can be determined by the method described, but to make the observation of value, cycloplegia must first have been induced. My reply is to ask how one can possibly discover either latent astigmatism or latent hypermetropia without studying carefully the refraction as found in the undisturbed eye. If complete paralysis of accommodation is induced in every case at the outset, of course no latent trouble will be discovered, but if lenses are prescribed on this examination alone, the oculist will find as stated by Schmidt-Rimpler that they are often discarded by the patient on the restoration of accommodation. To my mind the ophthalmologist who does not study his cases carefully before inducing cycloplegia as well as after, is almost as culpable as the one who does not induce cycloplegia at all. Again, if there is no such factor as latent astigmatism or latent hyperopia why induce cycloplegia at all. Cycloplegia can be of no value unless it changes the condition of the eye, and if it does this it has rendered something manifest that was before latent.

ANOMALIES IN OPHTHALMIC PRACTICE.

A. C. CORR, Carlinville, Ill.

1st. Congenital interstitial opaque infiltration of the cornea, not syphilitic, nor cicatricial.

2d. Case of Keratitis Materni, twice recurring.

3d. Piece of orbital bone encapsuled in the globe two and a half years, choroid not totally disorganized.

4th. Case of hemorrhage of the iris as a result of slight irridectomy in cataract operation.

5th. Case of calcareous lens becoming detached and floating—iritis—requiring removal.

6th. Is mixed astigmatism ordinary or anomalous?

Dr. J. L. Thompson, Indianapolis, Ind.: There are too many cases in Dr. Corr's paper for us to consider them fully at this time, so I shall speak briefly of one or two cases. The cases of interstitial keratitis congenital I consider true anomalies, for they are very rare indeed. Generally we meet with them very late in life, as late as 16 or 20 years of age. Regarding bone in the eye we are inclined when first starting out to think it must be rare, but a great number of eyes are found where bone is present. We may have bony metamorphosis in an eye twenty years after an injury and found only when we come to operate for the relief of sympathetic ophthalmia. I have only seen one case of hemorrhage from the iris, and there the vessels spurted as much as three feet from the eye.

Dr. H. V. Wurdemann, Milwaukee, Wis.: Referring to the case of calcareous degeneration of the lens, I would suggest that such degeneration of the nucleus is not as rare as has been supposed. Deposition of true bone tissue is however very uncommon. A personal experience in operation upon such a case would perhaps be of interest. Within the year a patient was brought to me in whom a few days before an attempt at extraction of a supposed cataract in the anterior chamber had been made. This had been attempted in the usual manner with the patient in the recumbent dorsal position, but on completing the section I found that the lens slipped back through the pupil into the vitreous. A few months later the patient noticed that the cataract had again come into the anterior chamber. Placing the patient on his face I sat on the floor and made a downward section. The lens came out. It was very hard, like stone.

Dr. R. L. Randolph, Baltimore, Md.: In reference to the first two cases, I may say that five years ago I saw in consultation three sisters affected with what I supposed to be an interstitial keratitis. The oldest was seven, the next five, and the youngest two years of age. Both corneæ in each case were the seat of a deep haze. This haze or cloudiness involved the substance proper of the cornea, and in the case of the oldest had begun to clear up all around the periphery symmetrically, leaving a central opacity of considerable size. This condition was present in the eyes at birth in all of the children, and of course vision was much interfered with. It was absolutely impossible to get a history of syphilis, and the family physician assured me that such an origin was not likely. I have regarded these and similar cases as instances of arrested development of the cornea; certainly the condition existed in prenatal life, and in the absence of demcnstrable evidences of syphilis I think it better not to regard the condition as one of inflamation, but as I said one of incomplete development, and there is every reason to believe that this development will reach its completion in all three cases. The same condition is found in the lower animals, notably the horse and dog, and we can readily exclude the influence of syphilis in such cases. The fact that the condition occurred in three sisters is no stronger evidence of an inflammatory origin than of embryologic origin, inasmuch as the influence of heredity in determining anomalies of development are unquestionable.

DR. A. C. CORR, Carlinville, Ill.: In regard to the first case, that of opaque infiltration of cornea, I think from what I have seen since, that it is of the class of micropthalmus as I have noticed some of this bluish white coloration of the cornea in that condition. The case of bone in the globe was a case of pure bone driven in by the blow of a rocket two and a half years previously, and not the result of ossification of any eye tissue.

The Executive Committee reported the special subject for collective study by special committee, "Detachment of Retina, its Etiology and Treatment." They further suggest to the Section as a topic for study and presentation next year "Cases of Optic Nerve Atrophy of Obscure Origin" both to report next year.

DR. EDWARD JACKSON: As the time for adjournment has now arrived I would call your attention to the fact that this is perhaps the largest meeting of ophthalmologists ever held in this country, much larger than ever before with us. Last year many members registered by mail, more in fact than were actually present. We have registered at present one hundred and six members, and I think we have had a most successful meeting.

[This completes the report of the section of Ophthalmology, A.M.A., Baltimore meeting.—ED.]

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ON THE MEANING OF THE WORDS "NYCTALOPIA" AND "HEMERALOPIA" AS DISCLOSED BY AN EXAMINATION OF THE DISEASES DESCRIBED UNDER THESE TERMS BY THE ANCIENT AND MODERN MEDICAL AUTHORS.

By JOHN TWEEDY, F.R.C.S.

Professor of Ophthalmic Medicine and Surgery in University College, and Assistant Ophthalmic Surgeon at University College Hospital; Surgeon at the Royal London Ophthalmic Hospital.

Whatever view we may take of the nature of logic, whether, with Archbishop Whately, we regard it as entirely conversant about language; or, with Sir William Hamilton and Dean Mansel, as concerned with the acts and states of mind indicated by the words we use; or, with J. S. Mill, as dealing with the things concerning which we argue; or, lastly, with Mr Stanley Jevons, as in a certain sense embracing all three, namely, language, thought and objects;[1] we must admit that language is one of the principal instruments of thought and that any imperfection in it, or in the mode of employing it, is liable to confuse and impede the process of thought, and to destroy all grounds of confidence in the result.[2] Unless our language be at once accurate, precise, and unequivocal, it cannot be trusted as an instrument either of record or of communication.

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[1] Jevons: "Elementary Lessons in Logic," 4th ed., p. 10.

[2] J. S. Mill: "A System of Logic," 7th ed., vol. i, p. 17.

In treating of the connexion between words and ideas, and of the fallacies, errors and disputes arising from uncertain or mistaken significations of words, Locke says, "I am apt to imagine that, were the imperfections of language, as the instrument of knowledge, more thoroughly weighed, a great many controversies that make such a noise in the world would of themselves cease; and the way to knowledge, and perhaps peace, too, lie a great deal opener than it does."[1] This is especially true of the language of science, where words are not only terms but definitions also. Hobbes defined *a name* as "a word taken at pleasure to serve for a mark, which may raise in our mind a thought like to some thought we had before, and which being pronounced to others, may be to them a sign of what thought the speaker had before in his mind."[2] The convenience and necessity of preserving the signification of words untainted is obvious. If I write the word "conjunctivitis," or "iritis," or "cataract," or "myopia," the reader at once forms a sufficiently intelligible idea of what I mean. So also with "mydriasis:" the mention of this word forthwith calls up the idea of a fixed dilated pupil, though here and there, perhaps, might be found one who, entrenching himself behind the sole authority of Aretæus,[3] would, pedantically, declare that the word called up in his mind the idea of "a pupil contracted to a small size." But what idea do I provoke when I employ the word "nyctalopia"? Nine persons out of ten, if they had the courage and confidence to avow it, would reply that they were not quite clear whether the term meant *night-blindness* or *night-sight:* though if pressed they would pronounce in favor of the latter. Nor would the answer seem unreasonable if we remembered that in all the best known published texts of Hippocrates, and in all translations of this author, and in nearly every book written on Ophthalmology during the last century and a half, the term "nyctalopia" is employed to denote the disease in which a person can see well by night and not by day. It is in this sense the word *νυκτάλωψ* is defined in the latest (6th) edition of Liddell and Scott's Greek-English Lexicon, on the one hand, and in the most recent and important treatise on modern Ophthalmology, on the other,[1] as well as in nearly every known scientific and medical lexicon, including that of Blancard,[2] Kuhn,[3] and the scholarly production of Littré and Robin.[4]

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[1] Locke; "An Essay concerning the Human Understanding," book iii, c. ix, sec. 21.

[2] "Computation or Logic," c. ii; cited by J. S. Mill, *op. cit.*, vol. i, p. 23; and by Jevons, *op. cit.*, p. 17.

[3] "De Sig. et Caus. Diut. Morb.," lib. i, c. vii; also "The Extant Works of Aretæus, the Cappadocian," trans. and edited by F. Adams. LL.D. Syden. Soc.· London. 1856; pp. 65 and 307.

In spite of this remarkable concensus of opinion among modern authorities regarding the meaning of the word nyctalopia, it can be shown that, according to the authority of the best classical writers, and according to the etymological construction of the word, the real meaning of the term nyctalopia is *night-blindness:* and consequently, that the meaning of the opposite term hemeralopia is *day-blindness*, and not *night-blindness*, as modern writers assert.

I have already mentioned the circumstances that led me to revive the discussion on the meaning of the words nyctalopia and hemeralopia.[5] The last number of these Reports contains a letter kindly and promptly written at my suggestion by Dr. W. A. Greenhill, the learned editor of Theophilus, of Celsus, and of Sydenham, and giving the results of a critical examination of the use of these words in the ancient Greek and Latin authors. The evidence adduced by Dr. Greenhill is conclusive. Henceforth, no one can defend the use of the word hemeralopia for *night*-blindness, and nyctalopia for *day*-blindness on philological or literary grounds. Dr. Greenhill has explained how the confusion arose. According to the ordinary texts of the Hippocratic writings, "nyctalopes" are said to be "those who see at night," whereas, for reasons stated at p. 287, note 3, the original definition almost certainly was "those who do *not* see at night." This conjecture Dr. Greenhill defends with great ingenuity and learning. His position may, I believe, be further strengthened by comparing the clinical and pathological affinities of the nyctalopic affection described in the Hippocratic writings and the night-blindness of subsequent authors. It is this latter task I wish more particularly to attempt in this article.[1]

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[1] "Graefe und Saemisch : Handbuch der Gesammt. Augenheilkunde."

[2] "The Physical Dictionary:" London, 1863.

[3] "Lexicon Medicum:" Lipsiæ, 1832, vol. ii, pp. 10–18.

[4] "Dictionnaire de Medicine:" 14th ed. Paris, 1878.

[5] Prefatory note to Dr. Greenhill's letter "On the meaning of the Words 'Nyctalopia' and 'Hemeralopia,'" published in the last number of these Reports, p. 284.

Many reasons might be assigned for believing the true meaning of the word nyctalopia to be night-*blindness* and not night-*sight*. The principal ones are seven in number, and may be briefly explained thus:—

1. All the ancient Greek medical writers, with the questionable exception of Hippocrates, and nearly all the Latin medical authors down to the end of the fourteenth century, as well as all other authors down to the middle of the seventeenth century, who define the term nyctalopia, use it in the sense of night-blindness.

2. As a *symptom* night-blindness is more frequent, more obtrusive, and more characteristic than night-sight. Indeed

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[1] It should perhaps be mentioned that this article was originally written to appear in conjunction with Dr. Greenhill's letter. It was, however, found on comparing them in print, that they travelled over much the same ground, though for different purposes. It was, therefore, decided to publish Dr. Greenhill's letter first and independently, in order to keep the philological and the pathological arguments distinct and separate. In the interval I have taken the opportunity to revise and extend some portions of my article.

most, if not all, of the alleged cases of the latter are instances of dread of light,—photophobia, or heliophobia (Demours),—due to inflammation of some of the tunics of the eyeball, rather than of blindness by day and sight by night.

3. As an *amaurotic state or condition* night-blindness, whether it occur sporadically, or endemically, or epidemically, is comparatively frequent, and has been recognized in all ages, while the opposite condition of true night-sight is extremely rare, if not altogether unknown.

4. Even as regards the nyctalopic affections mentioned in the Hippocratic writings, there is almost conclusive evidence that they are essentially the same as those described by Aristotle and other writers as night-blindness. Most of the associated and predisposing conditions are the same, and many of the alleged concomitants are clearly those of night-blindness.

5. There is excellent manuscript authority that the writer of the second book of the Hippocratic treatise, named Prorrhetics, did actually state that persons who do *not* see at night are called nyctalopes.

6. If the term nyctalopia do not denote night-blindness, then we are compelled to conclude either that Hippocrates failed to recognize the affection; or, if he did recognize it, he did not deem it necessary to describe it or even to mention its special name.[1]

7. If the term nyctalopia originally meant night-*sight* then we must conceive the philological absurdity of describing by a word having reference to night (*νύξ*), a pathological state or condition characterized by an inability to see during the day.

If these reasons be considered more closely, their force may perhaps become more apparent.

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[1] It should be remembered that the term *hemeralopia*, now used to denote night-blindness, was not known to the ancient authors; *see* Dr. Greenhill's letter, p. 284.

(1). The term nyctalopia is used to denote night-blindness by every one of the best Greek medical writers from Aristotle to Joannes Actuarīus. It is used in this sense also by Pliny in the first century; by Paré, Guillemeau, Schenk, and Forest in the sixteenth; and by Riolan, Ettmuller, and others in the seventeenth century.

A glance at Table I will show that of all the authors whose writings are quoted, to the middle of the seventeenth century, only one, namely Hippocrates,[1] may be cited as using the term nyctalopia in the sense of *night-sight*. It is true that some confusion of meaning seems to have existed in the time of Aëtius[2] in the fifth century, but Plempius,[3] in the seventeenth century, is one of the first writers who distinctly states that the term nyctalopia bears the double signification of night-sight (Hippocrates) and of night-blindness (Aëtius, Actuarius, and Paulus Aegineta). Plempius himself evidently inclines to the opinion that the former is the more correct, since he says, "Unde et Celsus non recte *Hippocratis* sententiam nocturnæ cæcitati accommodat."[4] Celsus,[5] it may be remarked, described night-blindness under the term "imbecillitas oculorum."

In the accompanying Table (I) only those authors are named who actually define the term nyctalopia or its cognates.

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[1] "Prorrhet.," ii.

[2] Tetra. ii. serm. iii. c. xlvi. Though Aëtius describes nyctalopes as persons who see well by day and nothing at all by night, he also states that it happens to some (nyctalopes?) that they see *better* by night than by day, adding that this is rare. It may be that in the latter instance Aëtius is really referring not to nyctalopes but to hemeralopes, without using the term. The passage is, however, taken in the sense of nyctalopes, by the Paris editors of Stephanus' "Thesaurus;" by Foësius, in his edition of Hippocrates, sec. ii, p. 91 (Francof., 1595), and by Plempius, "Ophthalmographia."

[3] "Ophthalmographia," 3rd ed.: Louvanii, 1659; lib, v, c. xxvi, p. 232*b*

[4] *Op. cit.*, p. 234*a*.

[5] Lib. vi, c. vi., sec. 38.

TABLE I.

NYCTALOPIA.

Night-Sight.	Night-Blindness.
Hippocrates (?).[1]	Aristotle.[2] Pliny[3] Galen.[4] Oribasius[5] Aetius.[6] Alexander Trallianus.[7] Paulus Aegineta[8] Joannes Actuarius.[9]
(16th Century.)	*(16th Century.)*
	Paré.[10] Guillemeau.[11] Forestus.[12] Schenkius.[13]
(17th Century.)	*(17th Century).*
Plempius[17]	Riolan.[14] Hoefer[15] Ettmuller.[16] Plempius (?).[17]

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[1] "Prorrhet.," ii.

[2] "De Generat. Animal.," lib. v, c. i.

[3] "Hist. Nat.," lib. viii, c. lxxvii; lib xxviii, c. xlvii.

[4] "Obselat. voc. Hippoc. Explanat.," in Froben's Latin ed., Basil, 1561, vol. ix, p. 149; or Cratandar's Greek ed.: Basil. 1538, pars v, p. 714. *See also* Dr. Greenhill's letter, p. 285, note 4.

[5] "Synops.," viii, 46: "De loc. affect. curat. ad Eunap.," iv, 18.

[6] Tetra. ii, serm. iii. c. xlvi.

[7] "De Arte Medica," lib. ii, c. vi.

[8] "De Re Medica," lib. iii, c. xxii: "De Nyctalope."

[9] "Med. sive de Method Medendi," lib. iv, c. xi; *ibid.*, lib. ii, c. vii, *νυκτάλωπας ἐαρινοὺς.*

[10] "Œuvres complètes d'Ambroise Paré," par J. F. Malgaigne: Paris, 1840, vol ii, p. 415; liv. xv, c. v.

[11] "Traité des Maladies de l'Œil:" Paris, 1585, p. 27.

[12] "De Morbis Oculorum," 1591, or "Observat. et Curat. Medic.:" Francof, 1602, lib. xi, obs. xxxviii.

[13] "Observat. Med. Rar.," ed by J. G. Schenkius: Francof., 1665 lib. i, p. 159.

[14] "A sure guide on the nearest and best way to Physick and Chyrurgery," trans by N Culpepper: Lond., 1671.

[15] "Hercules Medicus:" Noriberg, 1675, lib. i, c. viii.

[16] "Opera omnia:" Francof., 1688, "De Visus laesionibus." p. 475.

[17] "Ophthalmographia," 3rd ed.: Lovanii, 1659, p. 232

It would therefore appear, that, with the possible exception of Hippocrates, and the unknown writer of the Galenic work "Introductio, seu Medicus," no author of repute used the term nyctalopia to denote night-*sight* or day-*blindness*, before the seventeenth century. Even Plempius does not limit the term to night-sight; he rather speaks of two forms of nyctalopiasis, in one of which the patient cannot see well by night, in the other he cannot see well by day.

After the seventeenth century a very remarkable change occurs. The term nyctalopia loses the signification it has hitherto possessed, and gradually takes on that of night-sight, while the term hemeralopia is come into use to denote night-blindness. It is difficult to account for this change of meaning.

The term hemeralopia (except in the "Introd. seu Med.") is seldom to be met with in medical writings before the eighteenth century, though it is evident from the descriptions given by Paré, and especially by Guillemeau, that the term was not unfamilliar in their time.

Paré (*circa* 1578) says: "*Acies nocturna*: quand on void meiux de nuit que de iour, et se peut dire *Hemeralopia* en grec, *Œil de chat* en françois;"[1] and Guillemeau, writing in 1585, speaks of "aveuglement de jour, dict en Grec *Ημεραλωπια*."[2] Plempius, seventy-four years later, does not mention the term hemeralopia at all, though he discusses the problem "Cur nonnullorum oculi noctu sunt perspicaces, interdiu hebetiores?"[3]

With the eighteenth century, the term hemeralopia comes into frequent use, and almost invariably bears the meaning of night-blindness, instead of day-blindness as heretofore; while the meaning of the term nyctalopia, on the other hand, in its turn, is, as I have said, transferred from night-blindness to day-blindness. Mâitre-Jan as well as Bergen and Weise continue to employ nyctalopia as equivalent to night-blindness or day-sight, but Boerhaave, Guerin, and Sauvages use the word hemeralopia to denote this condition, while they apply the term nyctalopia to a confessedly rare condition of night-sight. The probable explanation of this extraordinary alteration, is that before the sixteenth century the works of Hippocrates were not accessible, and were consequently rarely consulted. Galen was the chief authority for the later Greeks and Romans, as well as for the Arabians; and though Hippocrates was held in high esteem by the ancient Greek and Latin physicians, he was not much studied during the Middle Ages. Galen had defined the Hippocratic term "nyctalopes" as those who are blind at night, and his definition was unquestioned till greater facilities occurred for consulting the Hippocratic treatises in the original.[1] In the sixteenth century Mercurialis (1588) and Foësius (1595) published their editions of the Hippocratic writings, and in the seventeenth century Vander Linden's edition appeared (1665). From this time more attention was given to the Hippocratic writings, and in the seventeenth and eighteenth centuries medical authors appealed to them in the original.

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[1] *Loc. cit.*

[2] *Op. cit.*, p. 28.

[3] *Op cit.*, lib. iv, prob. lviii, p. 177*b*.

In all these editions the reading of the passage in the second book of the Prorrhetics is: "*Οἱ δὲ τῆς νυκτὸς ὁρῶντες, οὓς δὴ νυκταλώπας καλέομεν, κ.τ.λ.*" "Those who see at night, whom we call nyctalopes, etc." Hence those who consulted the Hippocratic writings would naturally conclude that they had discovered an error in the commonly accepted meaning of the term nyctalopia and that the term really meant night-sight, and not night-blindness, as Pliny, Galen, Aëtius, Paulus Aegineta, and others had supposed.

This reading is still generally accepted as authentic. Even Littré[2] did not think it necessary to alter it, though he men-

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[1] See further on this question Dr. Greenhill's article on Galen and Hippocrates in Smith's "Dict. of Greek and Roman Biography and Mythology," vol. ii, pp. 210 and 435.

[2] "Œuvres Complètes d'Hippocrate," tome ix, p. 65, note 9.

TABLE II.
NIGHT-BLINDNESS.

Nyctalopia.	Hemeralopia.
(*18th Century*).	(*18th Century*).
Maitre-Jan.[1]	Boerhaave.[6]
Bergen and Weise.[2]	Guerin.[7]
	Suavages.[8]
(*19th Century.*)	(*19th Century*.
Grant.[3]	De Wenzel.[9]
	Bampfield.[10]
	Demours.[11]
	Simpson.[12]
	Mason Good.[13]
	Scarpa.[14]
	De la Rue.[15]
	Wardrop.[16]
Copeland.[4]	Middlemore.[17]
Power.[5]	Tyrrell.[18]

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[1] "Traité des Maladies de l'Œil:" Troyes. 1704; p. 271.

[2] "De Nyctalopia seu Cæcitate Nocturna." Haller, "Disput. ad Morb.," p. 359; Eranc., 1754.

[3] "Cyclop. of Pract. Med.;" edited by Forbes, Tweedie, and Conolly: London, 1834; Art. "Nyctalopia;" vol. iii. p. 183.

[4] "A Dictionary of Practical Medicine:" London, 1844.

[5] "Diseases of the Eye:" London, 1868; p. 453.

[6] "De Morbis Oculorum;" ed. Gotting: Gottingæ, 1750; p. 159.

[7] "Essai sur les Maladies des Yeux:" Lyon. 1769. p. 289.

[8] "Nosologia Methodica Oculorum." Selected and translated by George Wallis, M.D.: London. 1785. p. 190.

[9] "Manuel de l'Oculiste:" Paris. 1808; vol. i. p. 345.

[10] "A Practical Essay on Hemeralopia. or Night-blindness," read Dec. 7th, 1812: "Med. Chir., Trans.": London, 1814; vol. v, p. 32, *et seq.*

[11] "Traité des Maladies des Yeux:" Paris, 1818; vol. i, p. 423.

[12] "Observations on Hemeralopia or Nocturnal Blindness:" Glasgow, 1819.

[13] "A Physiological System of Nosology:" London. 1820; p. lxix, and pp. 300–3. Also "The Study of Medicine." 3rd ed.: London. 1829, vol. iv. pp. 200–1.

[14] "Saggio di Osservazioni e d'esperienze sulle Principali Malattie degli Occhi:" Pavia. 1801. p. 251; or the French translation by MM. Fournier-Pescay et Bégin: Paris. 1821; vol. ii. p. 318; or the English translation by James Briggs. 2nd ed., p. 471: London, 1818.

[15] "Cours Complet des Maladies des Yeux:" 2nd ed.: Paris, 1823; p. 370.

[16] "The Morbid Anatomy of the Eye:" 2nd ed.: London. 1834; vol. ii, p. 205.

[17] "A Treatise on the Diseases of the Eye, etc.:" London. 1835; vol. ii, p 225.

[18] "A Practical Work on the Diseases of the Eye:" London. 1840; vol. ii, p. 283.

TABLE II.

NIGHT-BLINDNESS—*Continued.*

Nyctalopia.	Hemeralopia.
(*19th Century*)—*Continued.*	(*19th Century*)—*Continued.*
	Hull.[1]
	Vidal (de Cassis).[2]
	Chelius.[3]
	Lawrence.[4]
	Desmarres.[5]
	Forbes.[6]
	Fabre.[7]
	Mayne.[8]
	Deval.[9]
	Costello.[10]
	Stellway von Carion.[11]
	Soelberg Wells.
	Seitz and Zehender.
	De Wecker.
	Galezowski.
	Tetzer.
	Schweigger.
	Macnamara.
	Lawson.[12]
	Bader.
	Arlt.
	Hersing.
	Et alii.

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[1] "Cursory Notes on the Morbid Eye:" London, 1840: p. 210, *et seq.*

[2] "Traité de Pathologie externe," etc.: Paris, 1840; vol. iii, p. 188.

[3] "Handbuch der Augenheilkunde:' Stuttgart, 1843; vol. i, p. 358.

[4] "A Treatise on Diseases of the Eye:" 3rd ed.: London, 1844; p. 584.

[5] "Traité des Maladies des Yeux: Paris, 1837: p. 696.

[6] "Cyclop. of Practical Medicine:" vol. iv: "Select Medical Bibliography;" p. 124.

[7] "Bibliothèque du Médicin-Practicien:" Paris, 1849; vol. x, p. 100.

[8] "An Expository Lexicon:" London, 1860.

[9] "Traité de l'Amaurose:" Paris 1851, p. 294.

[10] "Cyclop. of Practical Surgery:" London, 1861.

[11] It is not necessary to give detailed references to the writings of the following authors, as their works are well-known and in general use.

[12] "Diseases and Injuries of the Eye;" 3rd ed.: London. In the fourth edition, 1880, Mr. Lawson, at my suggestion, substituted the term nyctalopia for hemeralopia, to denote night-blindness.

tions that its accuracy had been impugned by Coray.[1] In some other quarters, however, the reading has been blindly accepted without any suspicion of doubt or difficulty. The late Sir William Lawrence, for example, was not content merely to accept the common reading of the Hippocratic text, but in order to justify the use of the word hemeralopia to denote night-blindness, actually states, "Hippocrates uses the term hemeralopia to denote night-blindness, and we may as well follow his example,"[2] whereas Hippocrates does not use the term hemeralopia at all.

An examination of Table II, will show how completely writers have turned about since the seventeenth century.

Had the classification adopted in Table I, been continued, it would have been found that nearly every author of the eighteenth and nineteenth centuries had been cited as using nyctalopia in the sense of night-*sight*. As no useful purpose would have been served by continuing such a classification, I have, in the second table, adopted another plan, namely, to arrange the authors of the eighteenth and nineteenth centuries according as they use the word nyctalopia or hemeralopia to denote night-blindness.

The general agreement among modern authors in using hemeralopia to denote night-blindness is startling, and might be held to be a sufficient reason for abstaining from any attempt to disturb the acquired *status quo* or to recover the original synonym. Even Dr. Copeland, who uses the word nyctalopia in the sense of night-blindness, does so on inadequate and unsatisfactory grounds; and Mr. Power confessedly merely copies, without criticism or comment, the definition given in Copeland's dictionary. Consequently, we are compelled to fall back upon Dr. Grant as one of the very few authors of the nineteenth century who deliberately use the term nyctalopia in the sense of night-blindness. Even he does not advance any specific justification of such a choice; and the advantage of his decision is minimised by the course taken by Dr. Forbes, the principal editor of the "Cyclopedia of Practical Medicine," in ignoring Dr. Grant's opinion, and adopting the opposite meaning in the Select Medical Bibliography appended to the fourth volume of this work.

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[1] Traité d'Hippocrate, "Des Airs, des Eaux, et des Lieux:" Paris, 1800; vol. ii, p. 45. *et seq.*

[2] "A Treatise on Diseases of the Eye," 3rd ed.: London, 1844, p. 584.

The results of this examination and comparison of ancient and modern writers may, therefore, be thus summarized: Up to the end of the fifteenth century writers are almost unanimous in using the word nyctalopia to denote night-blindness. The latter half of the seventeenth century is a period of transition. From the beginning of the eighteenth century onwards writers use the word hemeralopia in the sense of night-blindness, and nyctalopia for day-blindness.

(2). As a *symptom* night blindness is more frequent, more obtrusive, and more characteristic than night-sight. Every ophthalmic surgeon is familiar with night-blindness as a symptom of some diseases of the retina and of the choroid, and, in a lesser degree, of certain anomalies of refraction and accommodation; but no such symptoms as blindness by day with sight by night ever occurs. In some cases of keratitis, of iritis, and of choroiditis, there is more or less photophobia, so that vision is somewhat better when the eyes are shaded or when the light is dull. Most albinoes too, see better in a dim light: and whenever there is a small central opacity of the cornea or crystalline lens, vision is better in a dull than in a bright light, because then the pupil dilates, and rays of light pass through the clear margin of the cornea or lens. This is one of the forms of *visus nocturnus* of Boerhaave,[1] which he regards as identical with the nyctalopia of Hippocrates. The true nature of this form of night-sight is easily recognized, and in the strict sense of the term there is neither blindness by day nor sight by night. A similar criticism may apply to some of the instances referred to by Pliny, Plater, Rhodiginus, Plempius, Briggs, Boyle, Willis, Schenkius, Porterfield, and others, of persons possessing the power of seeing and even reading in the dusk or dark. So far as these accounts are trustworthy, they merely show that some persons may possess or acquire a degree of visual power enabling them to distinguish objects in an imperfect illumination. In the year 1867, Dr. Arlt,[1] of Vienna, described a form of retinitis which he designated *Retinitis nyktalopica*, in which, during the day, all objects appear to be covered by a silvery fog or haze, which is not noticeable at dusk. This form of retinitis does not, hovever, materially affect the present question.

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[1] *Op. cit.*, pp. 137 and 162: Probably the high authority of Boerhaave was the chief factor in establishing the change of the meaning of nyctalopia.

(3) It is scarcely necessary to bring forward any special testimony as to the occurrence of night-blindness as an amaurotic affection. It is known to occur sporadically, or as an epidemic, or to prevail endemically in certain localities. The opposite condition of night-sight is probably unknown as an amaurotic condition.

It is a matter of common knowledge that night-blindness as an amaurotic affection is still prevalent in certain localities. On the other hand, it is doubtful whether any amaurotic condition is known in which the eyes are blind during the day, but possess the power of seeing at twilight or in the dark. Ramazzini[2] has alleged, that about the spring of the year he frequently met with young persons who were unable to see during the day, but who could see when night came on again. In about a month they recovered. These observations have not, however, been confirmed by other competent observers.

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[1] "Der Bericht ueber die Augenklinik," 1867. See also American translation by Dr. Weightman; Philadelphia, 1868.

[2] "De Morbis Artificum," c. xxxviii; "Opera," p. 363: London. 1718.

Demours,[1] Middlemore,[2] Tyrrell,[3] Lawrence,[4] Mackenzie,[5] and most other authors, either deny the existence of such a disease, or assert it to be of extremely rare occurrence. The cases quoted by Mettrie,[6] Lassus,[7] Hillary,[8] Pye,[9] M. Guthrie,[10] Larry,[11] Isbell,[12] and others will not enable us to form a category of diseases characterized by night-sight or day-blindness, in the same manner as we may form a category of diseases characterized by night-blindness. The predominating symptom in most, if not all the cases mentioned is, as I have already stated, dread of light, or photophobia. I have often seen persons engaged in out-door occupations who were thought to be suffering from day-blindness. They could see fairly well in the twilight, but were unable to get about during the day in bright sunlight. In every instance I found either a small vascular ulcer or other affection of the cornea, or some form of chronic conjunctivitis. The symptom was, therefore, photophobia, due to inflammation, and not amaurotic.

(4). A comparison of the meagre accounts given in Hippocrates of the condition of the persons designated "nyctalopes," and the fuller descriptions of night-blindness by later authors will, I believe, lead inevitably to the conclusion that the nyctalopes of Hippocrates are the same as the night-blind individuals of later authors; and, hence, that Hippocrates, or the writer of the second book of the Prorrhetics, intended to say that persons *not* seeing at night are called nyctalopes. This comparison of Hippocrates with the later authors applies not only to the definition of nyctalopia, but also to the description of the disease, to its course, its etiology, and its treatment.[1]

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[1] *Op. cit.*, vol, i, p. 432.

[2] *Op. cit.*. vol. i, p. 233.

[3] *Op. cit.*, vol. ii, p. 283.

[4] *Op. cit.*, p. 589.

[5] "A practical Treatise on Diseases of the Eye;" 4th ed.: London 1854; p. 996.

[6] "Institutions de Medicine de Boerhaave, avec un Commentaire;" 2nd ed.: Paris, 1747; tome iv, pp. 431, 432.

[7] "Pathologie Chirurgicale," 1805–6; tome ii, p. 539, *et seq.*

[8] Quoted in Cooper's "Dictionary of Practical Surgery." Art. "Nyctalopia," vol. ii, p. 364.

[9] *Ibid.*

[10] "Duncan's Med. Commentaries;" vol. xix, p. 290: Edinburgh, 1795.

[11] "Memoires de Chirurgie Militaire;" tome i, p. 6: 1812.

[12] "Edinburgh Med. and Surg. Journal;" vol. ix, p. 269: Edinburgh, 1812.

The predisposing and indisposing conditions, the concomitants, and other peculiarities of Hippocrates' nyctalopia, may be briefly enumerated as follows:—

(*a*) It chiefly occurs in children, and young adults.[2]

(*b*) Dark eyes, and eyes with small pupils are predisposed to it.[3]

(*c*) Married women and virgins whose menses are regular are not subject to it.[4]

(*d*) Eruptions appear about the ears on the seventh or eighth day.[5]

(*e*) The formation of abscesses, and spontaneous diarrhœa are favorable prognostics.[6]

(*f*) The treatment consists of bleeding, purging, cupping, and the ingestion of ox's liver steeped in honey.[7]

(*g*) The disease is sometimes complicated by swelling of the gums, toothache, foul breath, swelling below the eyes, bleeding from the nose, ulcers on the legs, and enlarged spleen.[8]

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[1] It should be borne in mind that though Hippocrates is usually spoken of as the author of the works cited in this article, the best critics do not, for other reasons, believe that any of the treatises containing references to nyctalopia were really written by him.

[2] "Epid.," vi, sec. 7: "Prorrhet.," ii.

[3] "Epid.," vi, sec 7.

[4] "Prorrhet." ii.

[5] "Epid.," iv.

[6] "Prorrhet.," ii.

[7] "De Visu."

[8] "Prorrhet.," ii.

All these circumstances and peculiarities are, separately or combinedly, mentioned by other authors as pertaining to night-blindness.[1]

Age.—It is commonly assumed that Hippocratic nyctalopia is a disease of childhood. M. Sichel, in the introduction to his translation of the treatise *Περὶ ὄψιος*, published in Littré's edition of Hippocrates,[2] contends that the disease designated nyctalopia, and described in the second book of the Prorrhetics, corresponds exactly with the scrofulous and some of the epidemic ophthalmiæ of children. This assumption is not justified by the text, *νέοι, ἢ παῖδες ἢ νεανίσκοι*. The term *νέοι* applies not only to children, but to *men at least as old as thirty,*[3] and the term *νεανίσκοι* certainly includes men old enough to engage in battle, and to marry.[4]

The disease may, therefore, be said to occur not only in children (*παῖδες*), but also in young adults up to the age of forty. Moreover, the statement, presently to be discussed, that married women are not subject to the complaint, also implies that the disease is not exclusively one of childhood.

Colour of the eyes, etc.—Dark eyes and eyes with small pupils are said to be especially predisposed to Hippocratic nyctalopia.[5] Aristotle and other authors state these eyes show a similar predisposition to *night-blindness*.

In treating of some of the causes of the difference in colour of the eyes of different individuals, Aristotle remarks that it had been assumed, on insufficient grounds, that pale blue eyes (*γλαυκόμματα*) have more of fire, as Empedocles had said, and dark eyes (*μελανόμματα*) more of water than of fire; adding that it had been incorrectly stated that lack of moisture is the reason why blue eyes cannot see well by day, as want of fire is the reason why black eyes cannot see well by night.[1] In opposition to this view Aristotle asserts, with Democritus, that in every case vision is of water, and not of fire.[2] The eye is made of water, because this is transparent; and the amount of fluid (*τὸ ὑγρόν*) in the eye determines the colour of the eye. Eyes that have much moisture are dark, and those that have little are blue. This is the reason why blue eyes cannot see well by day, or black eyes by night; because blue eyes, on account of the scarcity of their moisture, are too much agitated by the light, whereas black eyes, from an excess of moisture, are not so easily set in motion.[3] Moreover, nocturnal light is very feeble, and does not excite sufficiently the copious fluids of the dark eyes. Corresponding differences are, he continues, to be observed in the kind of diseases that affect blue eyes and dark eyes respectively. Cataract (*γλαύκωμα*) occurs in blue eyes, and "nyctalopia" in dark eyes. Cataract being a dryness of eyes, chiefly affects old people, but nyctalopia being due to a superabundance of moisture occurs in those who are younger (*τοῖς νεωτέροις*).[4] Similarly, Levinus Lemnius, though he does not use the term nyctalopia, says that dark eyes may be of such condition that they see acutely during the day, but badly and less clearly at night. (Noctu vero obtuse minusque acute vivendi munere funguntur.)[5]

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[1] It is not now the question whether these allusions are true or not. They are merely cited as illustrating the opinions of the various authors respecting night-blindness, and as showing that they ascribed to night-blindness the same qualities as those said to belong to nyctalopia.

[2] Tome ix, p. 122, *et seq.*

[3] *See* Liddell and Scott's Greek Lexicon, *νέος* and *νεανίσκος*

[4] Herodt. iv, 72, 112, 114 and 115.

[5] "Epid.," vi, sec. vii. 1.

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[1] "De Generat. Animal.," lib. v, c. i.

[2] *Ibid.;* and "De Sensu," c. ii.

[3] Aristotle's theory of vision was that visible objects set in motion a transparent medium between them and the eye, and that this motion is, in its turn, communicated to the sense-organ. "De Anima.." lib. ii, c. vii; "De Sensu," c. ii and iii; "De Generat. Animal.," lib. v, c. i.

[4] Not necessarily young children, but *men of military age.* Thucid., v, 50. *See* Liddell and Scott. *νεώτερος.*

[5] "De Miraculis Occult. Naturæ." Francof., 1604; lib. iv, c. vi, p. 375

The size of the pupils.—Both Plempius[1] and Boerhaave[2] describe the connexion between night-blindness and narrowing of the pupil. Indeed, both these writers ascribe night-blindness to contraction and non-dilatability of the pupil rather than to thickening and opacity of the tunics and humours of the eye, as Aëtius had supposed;[3] "Quia in nyctalopia seu cæcitudine nocturna vesperi ægri non vident, sic tamen, ut die sat recte cernant; at qui crassas tunicas humoresque sortiti sunt, ne quidem die res probe intuentur."[4] According to Boerhaave the power of seeing at night is determined by the degree of dilatability of the pupil, and the reason why horses see better than men in the dark, is that horses have larger pupils, and hence more light can enter their eyes, but if the pupil do not dilate then they cannot see at night.[5]

The Immunity of Women.—Hippocrates states that married women and virgins who have the menstrual discharge regular are not subject to nyctalopia.[6] Celsus long after claimed for them a similar freedom from *night-blindness*:—"Præter hæc, imbecillitas oculorum est, ex qua quidam interdiu satis, noctu nihil cernunt; quod in fœminam bene respondentibus menstruis non cadit."[7] It will, I imagine, scarcely be contended that Celsus and the writer of the Hippocratic treatise are speaking of exactly opposite diseases, night-*blindness* and night-*sight* respectively. Exemptions so peculiar can only apply to similar diseases. The freedom from night-blindness of women in whom the catamenia are regular is mentioned by many other ancient

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[1] *Op. cit.*, p. 233.

[2] *Op. cit.*, p. 160.

[3] Tetr., ii; serm. iii, c. xlvi.

[4] Plempius, *loc. cit.*

[5] *Op. cit.*, p. 165.

[6] Prædict. ii, 40; Vander Linden, vol. i. p. 517; or, Prorrhet. ii. 33. 34, in Littré, t. ix, p. 64; or Prædict. II, in Foësius, sec. ii, p. 91. See also Adam's translation of "The Genuine Works of Hippocrates;" Syden. Soc.: London, 1849; vol. i, p. 267.

[7] "De Medicina," lib. vi, c. vi.

Greek and Latin authors, though this alleged immunity has not been confirmed by modern authors, except that women are less exposed to the conditions which tend to induce night-blindness. In an epidemic of night-blindness which occurred in the district of Mausanne, it was noted by Fleury and Frechier[1] that *pregnant* women were most affected with it, though no age or sex was spared.[2]

The appearance of eruptions about the ears,[3] *and the supervention of abscesses and diarrhœa*,[4] are regarded as favorable prognostics in the Hippocratic nyctalopia. Though Bampfield, to whom we are indebted for the most trustworthy modern account of night-blindness, states that he could not perceive "that any particular constitutions or ages, or eyes of any particular description, form, or colour," were particularly subject to night-blindness;[5] he did find "a spontaneous cure has sometimes succeeded to the eruption of boils on the face, or head, and to the formation of abscesses of the face, head, or ears."[6] He also asserts that in cases of night-blindness associated with scurvy, "after a fresh animal and vegetable food has been instituted and perservered in for a short time, and the scorbutic diathesis is corrected, if a lax state of the bowels is not induced by the change of diet, as is usually the case, I have frequently directed cathartics;" adding that, though he had never administered cathartics without employing local treatment, he had, in several cases, observed so prompt a recovery from the combination, "that I have been induced to ascribe much of the benefit obtained to their use."[7]

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[1] Quoted from the "Bulletin de Therapeutique," in Johnson's "Medico-Chirurgical Review," July 1842, p. 193; and cited by Mackenzie, *op. cit.*, p. 993.

[2] See also Dr. Grant's article, "Nyctalopla," in "Cyclop. of Prat. Med.," vol. iii, pp. 184. 185.

[3] "Epid.," iv.

[4] Prorrhet., ii.

[5] *Op. cit.*, p. 41.

[6] *Op. cit.*, p. 49.

[7] *Op. cit.*, p. 51.

The Treatment.—Perhaps the strongest argument that can be advanced in support of the opinion that the nyctalopia of Hippocrates, and that of the later Greek and Latin authors are the same, is the remarkable similarity in the reputed remedies. This is especially noticeable with regard to the local application of the bile or the sanies of liver, and to the ingestion of raw or roasted liver. The writer of the Hippocratic treatise "De Visu" recommends an ox's liver, but other writers seem to prefer that of the goat or the sheep. Galen, Celsus, and Pliny also mention and recommend this mode of treatment; indeed Pliny enters upon a long and detailed explanation of the *modus operandi* of goat's liver in curing persons who cannot see by night (*nyctalopas* a Græcis dictos).[1] Goat's or sheep's liver, or the liver of some other animal, is also recommended by Oribasius,[2] Marcellus,[3] Aëtius,[4] Alexander Trallianus,[5] Paulus Aegineta,[6] and Actuarius.[7] Guillemeau[8] refers to it, and Scarpa,[9] citing Dupont,[10] also mentions it. Adams, in his commentary on Paulus Aegineta,[11] states that Rhases, Avicenna, Mesue, Jesu Haly, Haly Abbas, and Alsaharavius also speak favorably of the application of roasted liver in cases of night-blindness.

Even in recent times the hepatic treatment of night-blindness has been employed. Dr. Grant[12] quotes the experience of Dr.

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[1] "Hist. Nat.," lib. xxviii, c. 47. *See*, further, Dr. Greenhill's letter, p. 285, notes 4 and 5.

[2] "De loc. Affect. cur.," lib. iv, c. 18.

[3] "De Medicamentis," cap. viii.

[4] Tetr. ii, serm. iii, c. xlvi.

[5] "De Arte Med.," lib. ii, c. vi.

[6] Lib. iii, c. xxii.

[7] "Med. sive Meth. Med.," lib. iv, c. xi.

[8] *Op. cit.*, pp. 27, 28.

[9] *Op. cit.*, p. 254; and vol. ii, p. 323, of the French translation.

[10] "Mémoire sur la goutte sereine nocturne épidémique, ou Nyctalopie."

[11] Book iii, sec. 22; Syd. Soc. ed.; vol. i, p. 434.

[12] *Op. cit.*

Meissener, and states that he himself "has repeatedly seen a cure *apparently* produced by fumigating the eyes with the vapour of a bullock's liver," though he does not believe that there is any specific virtue in the liver.

The concomitants of Hippocratic nyctalopia are swelling of the gums, toothache, foul breath, swelling below the eyes, bleeding from the nose, enlarged spleen, and ulcers on the legs.[1] I need scarcely say that this train of symptoms indicates the condition now called Scorbutus, of which night-*blindness* is a well-known symptom. The account given by Hippocrates may not be a perfectly accurate description of scorbutus in all its parts, but it is sufficiently correct to enable us to identify it. Van Swieten pertinently remarks: "Although it cannot be denied but the ancient physicians have reckoned up many of the symptoms of the scurvy in their descriptions of several distempers, handed down to us under a different denomination; yet it is not so apparent that they have seen the real nature of the distemper itself, nor so plainly described the symptoms of it, that one may be able from them to gather a full knowledge of the scurvy."[2] Of the accounts given in the Hippocratic writings, he remarks, "though he [Hippocrates] mentions a great many symptoms of the scurvy, seems not to have judged that they all concurred together to make up one particular distemper, but supposed them to come from some defects in the spleen."[3]

It would lead me too far to trace out all the points of resemblance, nor is it necessary for the purpose of this article that I should do so. I would, however, call attention to the fact that all modern observers are agreed that night-blindness is a frequent concomitant of scorbutus. Wolfgang Hoefer states that in the time of the Swiss war he had seen many soldiers and others suffering from night-blindness, due to the scarcity of provisions. These were all cured by an improved diet (curantur verò tales mutatione diætæ in meliorem).[1] Sir Gilbert Blane states that night-blindness, as a symptom of scurvy, had been reported to him by Mr. Telford,[2] and Dr. W. Kerr alleges that it was a commom occurrence among the scorbutic patients in the garrison of Gibraltar, during the siege of that place.[3] Andrew Simpson also mentions the frequent co-existence of night-blindness and scurvy.[4] The association has, however, in recent times been especially insisted on by Bampfield,[5] and has been confirmed by others. In some cases of scurvy occurring in H. M. brigantine "Griffon," and recorded by Dr. Bryson, night-blindness was the first symptom of the disease.[6]

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[1] "Prorrhet.," ii.

[2] "Comment in Hermanni Boerhaave Aphorism." Lug. Bat., 1753, t. iii, p. 590; or Eng. trans.: Lond., 1754, vol. xi, p. 278.

[3] *Op. cit.*, t. iii, p. 591: or Eng. trans., x p. 281.

The frequent association of scorbutus and night-blindness will not be disputed, and I have little hesitation in expressing the opinion that the many of the "nyctalopes" of Hippocrates were actually suffering from scurvy. If this opinion be well-founded, it lends powerful and independent support to the amended reading of *οὐχ ὁρῶντες*. in "Prorrhet.," ii, inasmuch as night-*sight* has never yet been observed as a concomitant of scorbutus, whereas night-*blindness* is often present.

This hypothesis likewise furnishes a clue to the *rationale* of the alleged cure of nyctalopia by means of bullock's or goat's liver, as related above. The fresh roasted liver, whether of a bullock, goat, sheep, black-cock, or other animal would act beneficially on the scorbutic condition of the body, and would in this way expedite the cure of the disordered vision. It is worthy of note, too, that many of the other remedies recommended in the Hippocratic collection for the cure of nyctalopia are also serviceable in scurvy, and that the favorable prognostic signs are also those of scorbutus.

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[1] "Hercules Medicus:" Noriberg, 1675; lib. i. c. viii, p. 72

[2] "Observations on the Diseases of Seamen." 3rd ed.: Lond., 1799.

[3] Art. "Scorbutus." in Cyclop. of Pract. Med.: Lond., 1834; vol. iii, p 684.

[4] *Op. cit.*

[5] *Op. cit.*, p. 33, *et seq.*

[6] "Ophth. Hosp. Rep.," vol. ii, p. 40; July, 1859

(5). For the fuller consideration of the fifth reason, namely, that there is good manuscript authority for the belief that the reading in the second book of the Prorrhetics should be that persons who do *not* see at night are called nyctalopes, I must, beyond what I have already incidentally remarked, refer the reader to Dr. Greenhill's letter and criticism, and especially to the valuable note on page 287. I may, however, observe that an omission of *οὐ* or *οὐκ* from ancient manuscripts is by no means rare. Such an omission occurs in the Hippocratic treatise *De Internis Affectionibus*, where persons who have ulcers on the legs with the skin black and thin, are said to be eager to walk about and to make exertion.[1] This should obviously be read, "are *not* disposed to walk about or to make exertion," and is so read by Littré[2] and Vander Linden,[3] both of whom supply the *οὐ*. The omission of the word *οὐ* is, in this instance, as in the second book of the Prorrhetics, obviously a fault of the copyist. The text in the latter instance, as Chamseru, Coray, Ermerins, and Dr. Greenhill believe, should be *οἱ δὲ τῆς νυκτὸς* ΟΥΧ *ὁρῶντες. κ.τ.λ.* Coray remarks[4] that the inadvertent omission of *οὐ* is especially common after words ending in *ος*, as in this instance (*νυκτὸς*), or in the treatise "De Aëribus, Aquis, Locis," where he has inserted *οὐ* between *πλῆθος* and *γλυκαίνεται*.[5]

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[1] Foësius, "Hippoc." sec v, p. 119; Linden, ii. 256.

[2] *Op. cit.*, t. vii, p. 280.

[3] *Op. cit.*, vol. ii, p. 256 It is an odd circumstance that while Van der Linden inserted *οὐ* in the Greek text of his edition of Hippocrates he did not correct the Latin translation which is, "Est autem ad deambulandum ac laborandum promptus."

[4] "Traité d'Hippocrate des Airs, des Eaux, et des Lieux :" Paris. 1800; vol ii, p. 45.

[5] "Traité d'Hippocrate des Airs, des Eaux, et des Lieux :" Paris, 1800; vol. i. p. 14. Littré (t. ii, p. 18) gets over the difficulty by substituting the work *ἐγγίγεται γλυκαίνεται*; while Adams, in his translation (vol. i, p. 193), omits the clause altogether.

The adoption of the reading *οὐχ ὁρῶντες* would not only get rid of the otherwise inexplicable confusion, but would furnish a meaning of the term nyctalopia more in accordance with the principles of etymology than *night-sight* supplies. Indeed, unless we are prepared to accept Voltaire's satirical definition of etymology, as "une science où les voyelles ne font rein, et les consonnes fort peu de chose," we must, independently of any other testimony, recognize the negative or privative element in the words "nyctalopia" and "hemeralopia." To employ the word nyctalopia as night-sight, and hemeralopia as night-blindness, seems, as I have already stated (p. 205 and 206), a philological extravagance and absurdity.[1]

The contention that true *night-blindness* was not known in the time of Hippocrates, has been already met by anticipation in the comments on Aristotle's explanation of the differences of colour in the eyes, and the causes of night-blindness in persons who have *dark* eyes. (*See* p. 217.)

On these grounds we must, I think, agree with Galen, that the true meaning of nyctalopia is night-blindness (*ὁ τῆς νυκτὸς ἀλαός*), and, consequently, that the true meaning of hemeralopia is day-blindness.

Unless, therefore, we are disposed to adopt the suggestion of the late Dr. Mackenzie, not to use these terms at all, in any sense, we should retrace our steps, and abandon the later (false) meanings for the original and true ones.

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[1] See futher, Dr. Greenhill's critical remarks, p. 288, *et seq.*

SECTION OF OPHTHALMOLOGY, COLLEGE OF PHYSICIANS OF PHILADELPHIA.

Reported By CHAS. A OLIVER, M.D., Philadelphia, Pa.

A stated meeting of the Section on Ophthalmology was held in the Lower Hall, College of Physicians of Philadelphia, on April 16, 1895, Dr. Wm. F. Norris, Chairman, presiding. Present, Drs. Fenton, Hansell, Harlan, Norris, Oliver, Randall, Risley and Stahl, Fellows of the College, and Drs. Archer, Cassell, Cummings, Murphy, Pancoast, Perine, Seaman of Milwaukee, Stevens and Ziegler as guests.

Dr. Geo. C. Harlan showed a case of irideremia in a twenty-four-year-old colored woman, in which there was the usual cataractous condition of the lenses. He stated that it was his purpose to endeavor to better vision by needling. In answer to an inquiry by Dr. Randall, whether the case presented any hereditary taint of a similar nature, Dr. Harlan asserted that no such influence could be found in this instance.

Dr. Wm. F. Norris reported a case of leuco-sarcoma of the choriod producing secondary glaucoma, and made some remarks upon the preservation of the specimen in formol. Examination showed that the pressure symptoms had advanced sufficiently far to give rise to a pathologic excavation in the optic nerve head. As regards formol, he stated that although the drug produced a marked shrinkage in the specimen, yet the great advantage that this material possessed over other preservatives was that the tissues were not stained or discolored. He had found that most excellent sections could be prepared in four or five days after the first immersion.

Dr. Charles A. Oliver made some remarks upon a case of essential atrophy of the conjunctiva and showed a water color sketch of the external condition. He desired to place this special type of case upon record on account of its extreme rarity.

Dr. S. D. Risley read the notes and exhibited a sketch of opacity of the cornea simulating lead deposit. The case was of extreme interest as having given a definite history of the prolonged and continuous use of a solution of acetate of lead. Careful analysis made by a competent chemist failed to reveal any trace of any salt of lead.

Dr. Harlan asked, in view of the fact that there were so many reported cases of clinical evidence of lead depositions, whether there were any instances in which chemic examination had revealed the presence of lead in the opacity?

Dr. Risley stated, in answer, that he had not found any in the literature at his command.

Dr. Harlan exhibited a case of embolism of the central retinal artery, in which a large hemorrhage appeared during examination.

Dr. Risley spoke of having seen a case of retinitis albuminurica in which, while the patient was sitting in his office being examined, a bright red hemorrhage appeared in the lower part of the fundus. This increased in size while he was looking at it. After instillation of cocaine into the eye, so as to better observe the condition, he had full opportunity to watch the blood spread over a large portion of the lower part of the fundus as a thin membranous veil. He watched this extravasation of blood at intervals for several weeks' time. The eye-ground showed numerous other striated hemorrhages and plaques that are so characteristic of albuminuric retinitis.

Dr. Hansell stated that although never having seen the actual appearance of such hemorrhages, yet he had frequently seen cases in which fresh extravasations had appeared during the intervals between the daily examinations.

Dr. Norris noted an unusual case which had come under his observation some years previously. The patient, a middle-aged woman, while sitting in church, noticed the appearance of a reddish-black spot before her eye. Examination upon the following day showed the presence of a large fresh hemorrhage, which covered the entire macular region and extended into the vitreous. The extravasation gradually disappeared and vision returned to normal. Dr. Norris stated that the interesting point in this case was the fact that the patient began to lose her sight when she was not making any special physical exertion.

Dr. Fenton stated that he had had the opportunity of twice noticing the onset of retinal hemorrhages in a case of albuminuric retinitis which was under his repeated observation for several hours daily for sixteen days. He also called attention to the fact that he had frequently observed the appearance of fresh hemorrhages after intervals of a few hours.

Dr. Oliver gave a blackboard demonstration of two cases of subconjunctival dislocation of the lenses, occurring in the same week. Both lenses were removed and the eyes were fast becoming quiet and well, with recovery of useful vision. To an inquiry by Dr. Harlan, whether the capsules were ruptured in these instances, Dr. Oliver said that they were not.

Dr. Norris stated that he possessed a specimen of such a dislocation of the lens in which it could be plainly demonstrated that the capsule was intact.

The Section then went into executive session. Upon motion, adjourned.

Charles A. Oliver,
Clerk of Section.

ASTIGMATISM OF TWENTY-EIGHT DIOPTRICS.

By DR. CHAS. W. DODD, Cincinnati, Ohio.

Of the great variety of cases that come under the hands of the oculist, there are none from which such gratifying results (both for patient as well as physician) are obtainable as from the various errors of refraction, either congenital or acquired, causing both imperfect vision and troublesome reflexes

This patient whom I present to night exhibits most impressively the damage capable of being wrought upon the eyes by that obstinate disease, trachoma, commonly called granulated lids. As a child he became the victim of that affliction, and the left eye was eventually so seriously impaired that, ten years ago, it became necessary to remove it. Soon after this the right eye became useless, owing to severe inflammation, involving the cornea, and after this subsided the cornea, although clear and transparent, was left seriously misshapen, the result of cicatricial contraction and loss of substance in the cornea itself. Trachomatous inflammation has long since subsided, but has left the one remaining eye with vision less than $\frac{1}{30}$, merely enough to see his way about; he is totally unable to earn his own living. For years he has been in the hands of various oculists, both here and in other cities, but never received any encouragement as to betterment of his vision. An oculist in Jamestown, N. Y., was the only one who ever attempted to fit a correcting lens, and he was wearing that glass when he was referred to me. It was a convex cylinder of 12 diopters, axis 180°; it enabled him to work in a shoe factory, but he relied more on his sense of touch than upon his sight.

A glance at the cornea through Placido's keratoscope, revealing a vertical, long, thin oval, convinced me it was a case of astigmatism, of very high degree, against the rule, and probably of mixed type. Javal's keratometer confirmed my belief; the degree of refraction in the horizontal meridian was 60 diopters, and that of the vertical meridian 32 D. This was a departure from the normal average of 17 D. in excess in the horizontal, and 11 D. deficiency in the vertical. This corneal correction, added to an hypermetropia of 5 D., gave the immense improvement of vision $= \frac{1}{2}$, or fifteen-fold better than vision without the glass. He now reads any print in the newspaper, and is perfectly able to return to his regular work, that of operating a machine in the shoe factory. The lens he is wearing is a beautiful specimen of the grinder's art; it is a crossed cylinder, *i.e.*, —12. D. ax 95° $\frown$ + 16. D. ax 5°.

The successful result obtained in this case is a strong endorsement of the value of the keratometer. To have attempted to estimate the error by subjective tests would have been hopeless, and the ophthalmoscope or the skiascopic mirror would be equally inadequate. To my knowledge, ophthalmic literature does not record a more interesting case of astigmatism.—*Lancet-Clinic.*

SECTION OF OPHTHALMOLOGY, A.M.A., ATLANTA MEETING.

[The following is a list of the papers promised, so far, for the meeting of the Section of Ophthalmology, A.M.A., at Atlanta next May. Chairman Howe and Secretary Allport have been at work. They wish to add others to the lists. Those wishing to make a contribution should address either Dr. Lucien Howe, Buffalo, N. Y., or Dr. Frank Allport, Minneapolis, Minn.—Ed.]

Report of Special Committee on "Cases of Optic Nerve Atrophy of Obscure Origin." H. V. Würdemann, Chairman.

1. H. V. Würdemann: "Cases of Optic Nerve Atrophy of Obscure Origin, Occurring in General Diseases."

2. Geo. E. de Schweinitz: "Cases of Optic Nerve Atrophy of Obscure Toxemic Origin."

3. Harry Friedenwald: "Cases of Optic Nerve Atrophy of Obscure Peripheral Origin."

4. C. W. Kollock: "Cases of Optic Nerve Atrophy of Obscure Origin, Occurring in Cerebral Diseases."

5. C. Dunbar Roy: "Cases of Optic Nerve Atrophy of Obscure Origin. Occurring in Spinal Diseases."

Report of Special Committee on "Detachment of the Retina, its Etiology and Treatment." R. E. Randolph, Chairman.

6. R. E. Randolph: Subject unannounced.

7. F. C. Hotz: Subject unannounced.

8. E. E. Holt: Subject unannounced.

9. J. E. Weeks: Subject unannounced.

10. T. E. Murrell: Subject unannounced.

11. Jno. F. Fulton: "Operative Treatment of Detached Retina."

12. L. F. Lane: "Report of a Case of Detached Retina, Occurring in Chronic Brights Disease."

13. W. T. Montgomery: "Electrolysis in the Treatment of Detached Retina."

14. E. Oliver Belt: "Consanguineous Marriages, as a Cause of Retinitis Pigmentosa."

15. S. D. Risley: "Secondary Glaucoma."

16. Leartus Connor: "Causation and Management of Glaucoma?

17. Edward Jackson: "The Value of Homatropine in the Diagnosis of Ametropia."

18. T. E. Murrell: "A Study of the Visual Annoyances in Muscular Anomalies of the Eye."

19. Casey A. Wood: "The Field of Fixation in its Relation to Heterophoria."

20. Henry Wilson Ring: "Three Cases of Monocular Vertical Nystagmus"

21. F. T. Smith: "The Use of Caustics in Epithelioma of the Lids."

22. A. E. Prince: "The Treatment of Ectropion of the Lower Lid."

23. Lyman Ware: "Report of 100 Cataract Cases."

24. A. J. Erwin: "A New Needle for Secondary Cataract."

25. G. E. de Schweinitz: "Concerning Central Scotama with Particular Relation to the Papilla, Macular Bundle and the Cortical Visual Centers."

26. E. J. Bernstein: "Sub-Conjunctival Injections."

DR. RISLEY'S TABLE.

[The Table found below should have appeared in connection with Dr. Risley's paper which was published in the last issue of the Record. In some way the copy was lost, and thus this important part of the Doctor's paper failed to appear. His paper will be found in No. 5. Vol. v. page 188.—Ed]

Summary of Refraction Errors and Direction of Meridians of Shortest Radius in 2,500 Pairs of Eyes—1,300 in Private—1,200 in Hospital Records.

	Private.		Hospital.	
Simple myopia	7	.5%	25	2.0%
Simple hypermetropia	72	6.0	253	21.0
Monocular astigmatism	70	5.0	94	7.8
Binocular astigmatism	1.151	88.5	828	69 0
Total cases	1,300		1.200	
	Private.		Hospital.	
Binocular symmetrical astigmatism	694	60.2%	613	74.4%
Binocular asymmetrical astigmatism	310	26.8	158	19.8
Heteronymous astigmatism	123	10.6	40	5.2
Homonymous astigmatism	24	2.1	17	1.2
Total binocular astigmatism	1.151		828	
Symmetrical astigmatism				
(*a*) According to rule (homologous)	543	78.2%	559	97.7%
(*b*) Against rule (heterologous)	151	21.8	54	2.3
Total symmetrical astigmatism	694		613	
Asymmetrical astigmatism				
(*a*) According to rule	223	71.8%	126	70.1%
(*b*) Against rule	87	28.2	32	20.9
Total asymmetrical astigmatism	310		158	

Direction of Meridian of Shortest Radius in all Cases of Symmetrical Astigmatism.

Meridian at 90°		57.0+%
Meridian inclined 15° or less on each side		19.7+
Meridian inclined from 15° to 30°	"	4 0—
Meridian inclined from 30° to 45°	"	1.0
Meridian at 180° or 0°	"	12.0
Meridian inclined 15° or less	"	4.0—
Meridian inclined from 15° to 30°	"	2.0
Meridian inclined from 30° to 45°	"	.5

THE OPHTHALMIC RECORD,

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G. C. SAVAGE, M.D., Editor and Publisher.

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Read in China.

The text-book on Ophthalmology, by Drs. Norris and Oliver, has been translated into the Chinese language. This is another evidence that this ancient people are awaking to the importance of keeping up with the times. We congratulate the Authors and wish for them that they may be able to speak in still other tongues.

Section of Ophthalmology, A. M. A., Baltimore Meeting.

In the last issue of the RECORD was completed the publication of the scientific proceedings of the Section of Ophthalmology, at the Baltimore meeting. The papers, which in the main were of a high order of merit, we were able to give only in abstract, but the discussions elicited were published in full. The complete papers and the discussions have already appeared in *The Journal* of the Association, the Editor of which has announced that all this matter has been collected, properly arranged and bound in a neat volume which is now for sale at $1.00 per copy. It will make a valuable addition to the library of any Ophthalmologist. Orders should be sent to Dr. Jno. B. Hamilton, Chicago, Ill.

The Direction of Meridians of Greatest Curvature in 500 Consecutive Cases of Refraction.

The announcement of the title of Dr. Risley's paper, published in the last issue of the RECORD, led us to a study of the last. 500 cases. of astigmatism, recorded in our private case-books The result of this study shows that the meridians of greatest curvature

Converged above in 159 cases;
Diverged above in 154 cases;
Were parallel, at 90°, in 132 cases;
Were parallel but oblique in 5 cases;
Both were at 180° in 42 cases;
At right angles in 8 cases.

It is not likely that a study of five times as many cases would have materially altered the results. In more than half of Dr. Risley's cases the meridians of greatest curvature were at 90°; while less than one-third of our cases showed the same location. We would suggest that a very practical question in the study of oblique astigmatism is, "Do the meridians of greatest curvature diverge or converge above?"

Ophthalmic Methods Employed for the Recognition of Nerve Diseases

Is the title of a little book fresh from the pen of Dr. Charles A. Oliver. Knowing the close kin-ship which exists between Ophthalmology and Neurology, he has dedicated the work to that Prince of Neurologists, S. Weir Mitchell, M.D., LL.D. The book is interesting to one who has long practiced the several methods set forth; but it will be most useful to beginners in the study of Ophthalmology. The neurologist and the general practitioner of medicine can learn much of value from its 43 pages.

He studies first the direct and indirect methods of using the Ophthalmoscope, and oblique illumination. He next devotes a few pages to form and color tests. Later he speaks of the motility of the iris muscles; and concludes the book with a brief study on muscle equilibrium.

Nyctalopia and Hemeralopia.

While in Europe in 1894, in conversation with Mr. Tweedy, he incidentally referred to a paper which he had published some years ago on "The Words, Nyctalopia and Hemeralopia." Not having had the opportunity of reading this paper, (it was published in the Royal Ophthalmic Hospital Reports, 1882,) we asked him for a copy, at the same time requesting him to grant us the privilege of republishing abstracts from it, in the RECORD. He kindly granted our double request. The paper proved so interesting that we decided to give the whole of it to our readers.

Recently we have looked into a number of books that have been written since Mr. Tweedy's paper was first published, and in all, Nyctalopia is made to apply to day-blindness, thus showing that these authors either had not read Mr. Tweedy's paper or had ignored its very clear teaching. Norris and Oliver alone have made any apology—and that in a foot-note—for perpetuating the error. Error, however ancient, and though often repeated ignorantly, should always disappear under the light of truth. Mr. Tweedy's paper will not only be read, but it will also be appreciated.

Annual of the Universal Medical Sciences, 1895.

The eighth issue of this valuable work, in five volumes, has just come from the press. The Editor, Dr. Charles E. Sajous, who was a class-mate of the reviewer, was noted in his college life for his energy and activity, characteristics which have continued to be a part of his being during all the years that have followed. It is not astonishing that he has gathered around him a great company of active, energetic, painstaking men, from the several departments of medicine and surgery; nor is it to be wondered at that the united labors of all these should result in giving us the valuable work which is before us. From two thousand one hundred and seventy-five publications, they have gathered the grain of medical thought, possibly with some chaff, and have garnered it in five compact, well-written volumes. We have not had time to read all, nor could we form a just judgment as to all that these volumes contain. There are five departments in which most of the readers of the RECORD will feel an interest, viz: (1) Eye, (2) Ear, (3) Throat, Nose and Larynx, (4) Intubation, and (5) Neurology. The first of these, under the editorial management of Dr. Chas. A. Oliver, as would be expected, fairly, if not fully, presents the progress made in Ophthalmology within the time covered. This part of the work covers 186 pages in volume 5. The work is well classified and will richly repay the reader.

In the second department to which attention is specially directed, the editorial work was divided, Dr. Chas. S. Turnbull having charge of Otology, and Dr. Sajous, Rhinology and Laryngology. Their names alone would give assurance of work well done. The combined space occupied by these two Editors is 186 pages (Turnbull, 54; Sajous, 132).

O'Dwyer's work on Intubation occupies 10 pages, and fully reviews the work, in that line, done during the preceding twelve months. The strange fact of *ex*tubation being more difficult than *in*tubation, is emphasized.

The very close relationship that Ophthalmology bears to Neurology should interest every Oculist in the department edited by Dr. Landon Carter Gray, on diseases of the brain, also in the department on diseases of the mind, edited by Dr. George H. Rohé.

While we have referred only to those departments of the ANNUAL in which the Oculist would take the deepest interest, we would conclude this notice by repeating what is a generally accepted opinion touching the specialist: "Other things being equal, he is the best prepared for his special work who keeps nearest up with the progress of medicine in all of its departments." There is no better way for doing this than by possessing and using the ANNUAL.

Running a Medical Journal.

Much might be said on this topic that will not be said now. Those who imagine that it is an easy thing to do are deluded mortals; and nothing can more effectively dispel the delusion than the undertaking of the work. There are many ways in which readers may be helpful to a journal, but to only one of these do we wish now to call special attention. They can be very helpful by buying such material as they may need from those who contribute largely to the support of the publication they read, by paying well for the advertising space they occupy. It is always good for the periodical for the buyer to state that he saw the advertisement in it, when making an order.

We wish now to call special attention to those firms and institutions that have favored the RECORD with their patronage during the year now closing. On page 2 of the cover

The McIntosh Battery and Optical Co.,

show the readers that they would appreciate their patronage. The well-known character of this firm would be a guarantee of the good quality of apparatus, etc., furnished by them. Our personal experience with them has been most satisfactory.

On the third page of cover will be found the advertisement of

Theo Tafel,

who is skilled in his department of work, and exercises due care in filling such orders as may be committed to him. He keeps on hand a large stock of instruments of his own manufacture and also of the make of others. He can fill any order within a reasonably short time.

On the same page, at the bottom,

The Nicholson House,

one of the leading hotels of Nashville, tells of its convenient location, comfortable rooms, and splendid fare. During the great exposition, the Tennessee Centennial and International Exposition, which will be held in this city in 1896, for 100 days, beginning September 1st, the Nicholson will expect to entertain many visiting physicians.

On page 4 of the cover

The Geneva Optical Company

display their "grip eye-glasses," setting forth the points of merit. From time to time they have advertised on this page other of their optical goods, including some of their own inventions, of which they are the sole manufacturers.

On page i, fronting the last page of reading matter,

Reimold and Meister

publish a cut of their latest and best trial frames, in which they justly feel a great pride. On this page they have also displayed during the year the Herbert Phorometer, which is an instrument that gives great satisfaction.

On page ii the advertisement of

The S. Galeski Optical Co.,

appears for the first time. They are seeking by good work and fair dealing to build up a trade in the country tributary to Richmond.

On page iii will be found the advertisement of

Fehr's "Talcum Baby Powder"

with which the readers of medical journals have long been familiar. It compares favorably with other similar preparations.

Following this on the same page is the card of

Vaughn & Partee,

local druggists, who are known to some of the readers of the Record as having supplied them with the Mules' Iodoform discs for the treatment of corneal ulcers. Literally, they have sent these discs on orders to Oculists "from Maine to California and from the Lakes to the Gulf."

On the same page is the advertisement of

DeMoville & Co.,

one of the oldest drug houses in this city, whose reputation is not local. Orders for standard drugs used in special practice can be promptly filled by them.

On page iv is a cut representing the new building now occupied by the

Medical Department of the Vanderbilt University.

A finer and more convenient structure for the purposes of medical teaching cannot be found.

On page v, is the advertisement of

The Perfection Chair Co.

The Perfection Chair, which we have had in use for 8 or 10 years, still gives perfect satisfaction. We have never heard an owner of this chair complain. We suppose their other goods equally well made.

On page vi, will be found the display advertisement of

F. A. Hardy & Co.

who have patronized the RECORD from the beginning. This firm is well known throughout the South and West for promptness, accuracy and fair dealing. Their Ophthalmometer differs from any other on the market in some respects that please those who use it.

On page viii,

E. Kirstein's Sons' Co.

advertise their Wilson Phorometer, which we have found to be a very helpful instrument. By it both the *balance* and *strength* tests may be quickly and accurately made.

THE
OPHTHALMIC RECORD.

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THE RADICAL CURE OF STRICTURES OF THE LACHRYMAL DUCT.*

By DR. SAMUEL THEOBALD, Baltimore, Md.

Although seventeen years have passed since I first endeavored to convince ophthalmologists that the confessedly poor results commonly obtained in the treatment of strictures of the lachrymal duct were due to the inadequate size of the probes usually employed,[1] and although even before that time, others had advanced similar views (H. D. Noyes, E. Williams, Weber), it would seem, judging from the literature upon the subject, that but a small minority of ophthalmic surgeons, both in Europe and America, have, up to the present time, been induced to accept this view as correct, and to modify their practice accordingly.

My employment and advocacy of the use of much larger lachrymal probes than had previously been thought necessary, was based upon anatomical, as well as upon clinical, investigation, as was set forth in my first publication upon this subject: nevertheless, overlooking this fact, those who have criticised my views have generally done so upon anatomical grounds, contending that the normal calibre of the duct is such as to preclude the use of the larger probes of the series which I have recommended. For this reason, at the risk of being accused of repetition, I desire at the outset to say a few words upon this point.

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*Read at the Eighth International Congress of Ophthalmology, Edinburgh, 1894.

[1] Transactions of the Medical and Chirurgical Faculty of Maryland, April 1877.

In my original paper, to which reference has been made, this statement occurs: "With a view to substantiating the opinions advanced, that the indifferent results which have been obtained by Bowman's method of treating strictures of the nasal duct are due to the fact that the probes usually employed are not sufficiently large, I have been at some pains . . . to ascertain the usual size of the duct in its normal condition, convinced that its diameter would be found to be so much greater than that of the largest of Bowman's probes that the absurdity of expecting to accomplish with the latter a thorough dilatation of the canal would be rendered manifest." The method adopted at that time to determine the average calibre of the canal consisted in simply ascertaining by trial how large a probe could be passed, first, through the bony lachrymal canals of a large collection of skulls; and next, through the lachrymal canals of a number of bodies which had been obtained for dissection. For this purpose a series of metal probes, varying in diameter from 3mm. to 7mm. was provided.

Thirty-nine skulls were examined, and measurements made of seventy-three ducts, several of the skulls having only one duct in a sufficiently perfect condition to permit of measurement. All of the skulls but two were those of adults. Twelve canals, belonging to six bodies in the dissecting-room, were measured, but the true size of two of these was not ascertained, as the largest probe which I had at the time (3.75mm.) was too small to gauge their calibre.

As was to be expected, the measurements showed, apart from pathological changes, great variation in the size of the ducts examined. Among the seventy ducts belonging to the adult skulls none was found so small as not to permit the passage of a probe of 3mm. diameter, and there were only six through which a larger probe than this could not be passed. Thirty-five, or fifty per cent. of the whole number, permitted the passage of probes varying in diameter from 4.25mm. to 7mm. Seventeen of these admitted a probe of 4.75mm. diameter; four, one of 5.25mm.; one, one of 5.75mm., and one, the fellow to this, one of 7mm. Between the canals of the same skull an appreciable difference in size was discovered in eighteen instances. In four the difference was only .25mm., in ten it was .50mm., in one it was .75mm., in two 1mm., and in one it amounted to 1.25mm.

The measurements seemed to show a larger average size for the ducts belonging to the bodies in the dissecting-room than for the bony canals of the skulls; but this, doubtless, was only apparent, and was due to the method of determining their calibre. In the skulls, the thin plates of bone which go to form the walls of the lower part of the duct were often found to be warped and bent out of shape in such a way as to encroach upon the lumen of the canal, and for this reason as large a probe as might otherwise have been introduced could not be passed without the risk of fracturing these brittle plates. In the ducts of the bodies in the dissecting-room there was, of course, no difficulty of this sort. Notwithstanding this fact, however, the average size of the probes passed through the seventy (adult) bony canals was 4.11mm. The average size of the probes which were introduced into the periosteum and mucous-membrane-lined canals of the dead subjects was, on the other hand, 4.47mm., the largest one passed having a diameter of 5.25mm.

These data, I think, afford a sufficient refutation to the charge that in advocating the use of a lachrymal probe having a diameter of 4mm., I had lost sight of the anatomy of the part. They also show, conclusively in my opinion, what they were expected to demonstrate, namely, the absurdity of attempting with a probe having a diameter of 1.50mm. (the largest of the series of six probes originally recommended by Bowman) to restore the normal calibre of a canal, the average diameter of which is somewhat over 4mm.

The practicability of using such probes being clearly shown, the questions arise: Are the results which follow their employment distinctly better than can be obtained by the small probes in general use? and what drawbacks, if any, attend the thorough dilatation plan which I advocate? Answering these questions in an inverse order, I would say, that no especial difficulty attends the introduction of the larger probes; indeed, they can be used with more freedom, and with much less risk of making a false passage than the small ones. The real trouble encountered in the treatment of strictures of the lachrymal duct, when any exists, is in the early stages, when comparatively small probes must necessarily be employed. The difficulty is due to the not infrequent presence of a constriction at the junction of the canaliculus and the lachrymal sac, which sometimes makes it no easy matter to introduce the point of even quite a small probe fairly into the sac. Once this is overcome, and the stage is reached when a probe of, say, 5mm. diameter can be passed into the sac, all trouble ceases.

With a probe of the size of No. 12 or 13 of my series considerable force is permissible, if necessary, in overcoming constrictions of the duct, provided one is sure that the point of the probe has been passed fairly into the lachrymal sac. Not infrequently, I have used the strength of both hands for this purpose, and I have yet to see any serious consequence result from this procedure. Doubtless, I have in a few instances fractured the thin plates of bone which form the lower part of the duct; but this is not a matter of moment, and, at most, is attended by slight inflammatory reaction and a passing ecchymosis. Indeed, I am not only satisfied that the use of considerable force is permissible, but I am sure that it has a markedly curative effect upon the carious walls of the duct, the result being not unlike that produced by the curetting of diseased bone in other parts of the body, Over and over again, as a result of the use of large probes, I have observed the rough and carious walls of the duct gradually assume a healthy condition, until, finally, all roughness disappeared, and the probe, on being passed, gave the impression of being in contact only with a normal mucous membrane. Doubtless this method of treatment is attended by more pain than when only incomplete dilatation is effected by small probes, because the passage of a tight probe is more painful than that of one which is not tight; but, as soon as it becomes no longer necessary to increase the size of the probe, this difficulty disappears.

Not infrequently, after a case of stenosis of the duct has been cured by the use of large probes, the canal is left more open than is usual in the normal state, so that when the nose is blown some air is apt to find its way through the duct and into the corner of the eye: but this causes little or no inconvenience and is not complained of. It would seem to indicate that the valve-like folds of mucous membrane near the lower orifice of the duct are, at least in a measure, obliterated by the repeated passage of the large probes. I have also observed during the course of the treatment, but more rarely, and only, it would seem, when there is caries of the upper extremity of the duct, a gradual shortening of the slit canaliculus, until, in some instances, it entirely disappeared, and the probe, on being introduced, passed directly into the sac instead of having first to be carried along the divided canaliculus. This change does not seem to interfere with the carrying off of the tears, or cause other inconvenience.

To the question, "are the results obtained by the use of large probes decidedly more favorable than those which the small probes afford," I feel warranted in giving a very positive answer. My use of the large probes has now extended over a period of seventeen years, during which time I have treated many cases and have had the opportunity of seeing a considerable number of them, from time to time, for years after the discontinuance of the probing, and my experience is that, with a few comparatively rare exceptions, the cases in which the treatment is thoroughly carried out are completely and permanently cured. So satisfactory, indeed, have my results been that there is no class of cases which I now undertake the treatment of with more confidence than I do strictures of the lachrymal duct: and I feel warranted in assuring my patients that, if they will submit to the course of treatment which I consider necessary, an entire and permanent cure of their malady is in store for them.

As opposed to this, I am sure not overdrawn, account of the favorable results obtainable by the use of large probes, there is almost the universal testimony of acknowledged authorities, that the usual treatment of these cases with small probes is most unsatisfactory, and seldom affords more than temporary relief.[1]

In conclusion, it may not be amiss to add a few words as to some of the details of the method of treatment of which I have spoken so optimistically.

In the first place, it is essential that the probes should be properly constructed, and especially that their extremities should be conical in shape and neither too blunt nor too sharp; their curve, also, which may be changed to suit special cases, is a matter of importance. The series of probes which I suggested in my original paper, and which I have used with much satisfaction ever since, comprises sixteen sizes. The smallest, No. 1, has a diameter of .25mm., the largest, No. 16, a diameter of 4mm., there being a difference in diameter between the successive numbers of .25mm.[1] Their peculiarities of shape can be best appreciated by an inspection of those which I pass around; they are also well shown in the accompanying illustration.

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[1] Fuchs: Text-book of Ophthalmology (English Translation), p. 515. De Schweinitz, Diseases of the Eye, p. 553. Brudenell Carter, Diseases of the Eye, American Edition, p. 203.

The smaller sizes, from No. 1 to No. 8, it is best to have made of coin silver; the larger ones, from No. 9 to No. 16, may be made of pure silver, of copper (nickel plated), or of aluminium. My preference is for the last named, as their lightness facilitates delicacy of manipulation. They are also, like the nickel plated probes, more slippery than the silver ones, and for this reason there is not so much resistance to their passage, and the pain attending it is appreciably less severe. The objection to making the smaller probes of aluminium is that it is less tough than silver and they are apt to break. The smallest sizes, Nos. 1, 2, and 3, are useful only for exploring the canaliculi, dilating contracted puncta, or overcoming strictures between the puncta and the lachrymal sac; they are too small, at least Nos. 1 and 2 are, to be of any service in dealing with constrictions of the nasal duct. For the latter purpose, I prefer not to use a smaller probe than No. 5 or 6, and I always begin the treatment with one of these, provided I cause it to enter fairly into the lachrymal sac; this point assured, I do not hesitate to use any reasonable amount of force which may be necessary to pass it through the duct to the floor of the nose. The impression, more or less prevalent, that such an exhibition of force is liable to injure the lining membrane of the duct in a way likely to produce an impermeable stricture is, I am sure, absolutely without warrant[2]

I invariably enter the lachrymal sac through the lower canaliculus, which I slit up with Weber's knife, using by preference the pattern in which the beak does not form an angle with the blade. Before introducing the knife, I pass one or more of the smaller sized probes through the canaliculus, so as to dilate it and overcome any strictures which may be present, and thus lessen the likelihood of the probed tip of the knife being arrested before it has entered the sac. I instil freely into the inner corner of the eye a four per cent. solution of cocaine before slitting the canaliculus and before each probing, and also anoint the probes with vaseline containing ten per cent. of cocaine. During the early stages of the treatment the probings are repeated every other day (never oftener, unless want of time compels such a course), and usually a probe one size larger is used each time. Occasionally it is found practicable to skip a number, and so advance more rapidly, and in other instances, when the probe is very tight, it may be necessary to introduce the same size several times, before an attempt is made to use a larger one.

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[1] Made by the Willms Surgical Instrument Company, 300 N. Howard Street, Baltimore, Md.

When as large a probe has been passed as is deemed necessary, the interval between the probings is gradually increased, until finally a month or more is allowed to elapse between them, and when several such intervals have passed, without any tendency to recontraction having manifested itself, the case is regarded as cured. In most instances, it is not at all difficult to re-introduce even the largest sized probes after these long intervals; but, occasionally, a contraction occuring at the juncture of the canaliculus and the lachrymal sac renders this impossible, although there may be no recurrence of the stillicidium or return of the stenosis of the duct. Including these long intervals, the treatment usually extends over a period of eight or ten months; but, the active treatment, which involves the frequent probings, is comprised within as many weeks.

I never find it necessary to employ any form of lachrymal syringe; but, in lieu of this, prescribe a collyrium, which the patient is instructed to drop into the inner corner of the eye several times a day, after having first emptied the lachrymal

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[2] De Schweinitz: *Diseases of the Eye*, p. 554.

sac by gentle pressure with the tip of the finger. The collyria which have proved most useful are a solution of bichloride of mercury, varying in strength, according to the sensitiveness of the eye, from 1:16,000 to 1:12,000, and a solution of alum and boracic acid in combination, containing two per cent. of boracic acid and one-half per cent. of alum. Lachrymal fistulæ, even when accompanied by a considerable amount of caries of the underlying bone, seem to require no especial treatment, but heal promptly as soon as the stenosis of the duct is overcome by the passage of the large probes.

My case books show that No. 16, the largest of the series of probes, is used in about sixty-six per cent. of all the cases, including children as well as adults, in which the treatment is thoroughly carried out. They show also that a considerable number of the cases in which a complete and permanent cure was effected by the use of the large probes, had previously been treated, without success, or with only temporary improvement, with probes of the ordinary size.

Finally, I may state that as there is little risk of making a false passage with the large probes, it is possible, after the surgeon has secured full dilatation, and when occasion requires it, for patients to pass them through their own lachrymal ducts. In several instances, where patients were unable to remain under my care as long as I thought necessary, I have been able to teach them to do this, and thus have secured them against the risk of a recurrence of their malady.

DISCUSSION.

Dr. Gruening, New York, said that shortly after Dr. Theobald published his paper, he (Dr. Gruening), convinced that the treatment with the Bowman probes was unsatisfactory, adopted the treatment advocated by Dr. Theobald. He could corroborate everything Dr. Theobald had stated. He saw the incredulous smiles on the faces of some of the members present when the large probes, especially No. 16, were advocated, but he could assure members that in many cases No. 16 could be passed with great ease, and without injuring the mucous membrane. He had cured, by the use of larger probes, a great number of cases that would not have been cured in any other way. On the occasion of a recent visit to Paris, he saw in one week three operations for extirpation of the lachrymal glands—an operation which he had never performed in that way and for that purpose. The cases were those of simple lachrymation, and without further examination and further treatment the lachrymal glands were extirpated. If those cases had been treated with the probes advocated by Dr. Theobald, he was sure the extirpation of the lachrymal glands would not have been necessary.

Dr. St. John Roosa, New York, said that in the criticism that he was about to make on what his fellow-countryman had said, he wished to observe in the beginning that in his opinion it was begging the whole question to compare one's cases with one's own cases. One's cases should be compared with other men's cases; and he, for his part, emphatically denied that in his experience the results in the treatment of lachrymal catarrh, which might be followed by lachrymal stricture, were confessedly bad. He admitted no such thing. They were confessedly good in his practice; and with the simple advancement that any intelligent human being would make in the practice of Bowman's method by enlarging the probes in certain cases, they had all that was necessary for such a large percentage of cases that nothing more need be added to them. As to the matter of nomenclature, he demurred to the assumption that everything was a stenosis or an absolute stricture: it seemed to him that any such nomenclature was faulty and unpathological. Many of these cases were simply catarrhal, and simply getting a punctum open, with mild treatment of the canaliculus. would cure them. There were cases of stricture followed by abnormal dilatations of the nasal ducts, in which these large probes might be used; but he felt no necessity in his own practice for the natural expansion of the principles of treatment as laid down by Bowman. He admitted the desirableness of enlargement of probes for certain cases, but simply to begin and continue with the use of large probes, no matter if the relative measurements of the duct might be as they had been delineated, he considered an unsound practice.

Mr. Swanzy, Dublin, said he just wanted to ask a question of Dr. Theobald, because he thought he had laid most stress upon the size of the probes, and did not tell the Congress anything about their curvature. The probes which had been exhibited had a remarkable curvature, which he could hardly think was suited to the direction of the lachrymal canal. He should like to ask whether the probes Dr. Theobald used had this curvature?

Dr. J. L. Thompson, Indianapolis, said he desired to ask Dr. Theobald whether he did not have cases, in spite of his large probes, which returned, and were blocked up just as much as ever? He had treated these cases for twenty-four years, and he had used probes large enough for a horse; and still, in spite of that, in the course of a year or less, those cases would return.

Dr. Risley, Philadelphia, said he should like to emphasize the remark made by Dr. Roosa, and to say that he, too, objected to take it for granted that the more conservative treatment of lachrymal obstruction was entirely unsatisfactory. It was not, if pursued on proper conservative methods. The only further remark he wished to make was that the physiological condition, upon which the lachrymal drainage was carried on, was neglected in this treatment. It was impossible to pass such large probes through the canaliculus without destroying the physiological relations of the duct itself. The normal lachrymal duct apparatus was a capillary tube, and was not a drain-pipe and in its normal condition he was sure that in the effort of blowing the nose, which Dr. Theobald had mentioned, the air should never pass into the orbit. When it was dilated to such a condition that the air passed back into the eye, it had been converted into a drain-pipe, and was no longer a capillary tube.

MR. PRIESTLY SMITH, Birmingham, said he should like to make one remark upon a principle which had not been mentioned. It appeared to him that what they ought to strive at for the cure of lachrymal obstruction, was not so much a maximum dilatation of the passage, as the maintenance of the passage in a state of openness. To his mind the use of a very large probe was quite unnecessary. They had not been told whether these large probes had to be passed frequently or not. In the text-books at the present time the principles laid down were frequent passage of probes of increasing size, and for a certain number of cases, extirpation of the lachrymal sac. In his practice frequent probing had entirely disappeared for many years. Of extirpation of the lachrymal sac he knew nothing; he never did it. He did not cure every case, but he knew a large proportion of cases were cured, or permanently relieved, simply by allowing the patient to wear for some months a probe, or, as it was called, a stile. The practice he employed was first to pass a rigid probe which they could get down into the duct, then immediately to use a lead probe, which will follow the curvature of the probe quite easily, to let the patient wear that for a few days. That, by its pressure, will so far reduce the swelling of the mucous membrane that the lead probe which goes in tightly this week, comes out quite loose next week. Immediately follow up by a silver probe accurately bent to the proper curvature, and lying in such a position that it was quite invisible and quite painless, and then beyond some simple cleansing of the eye, and a regular pressure upon the sac, so that no matter should be allowed to remain in sac, together also with some treatment of the lower end of the duct by means of astringents

—in that way, in his experience, they got a very large proportion of cures. Those probes of which he spoke might be worn without the least inconvenience for three months, and the whole thing reduced in complexity. The only disadvantage to the surgeon is, that whereas by the old method the patient must come at least twice a month, he need come, perhaps, only three times in all.

The President said that the credit of the proceedings which had been described by Mr. Priestly Smith, of leaving a probe in the passage, with the upper extremity lying in the slit-open canaliculus, belonged to Mr. Hume, of London, who introduced it over thirty years ago.

Dr. Lee, Liverpool, said he would not have interfered in the discussion were it not for the circumstance that there was a method of treatment that they adopted in Liverpool which had not yet been spoken of. He had seen some of those cases of extreme dilatation of the duct which Dr. Theobald had mentioned, and in which the canaliculus was entirely obliterated, giving a direct passage into the nasal duct at once. He had seen cases in which the tears ran immediately over the cheek and did not get into the wide passage which had been made by these very large probes. But the particular line of treatment which he wanted to bring before the notice of the Congress was adapted to even the worst cases, where there was a great deal of blood in the sac. It was this: Passing a hollow probe with one or more apertures in its side, and through the probe passing an antiseptic solution, probably for ten minutes each time. This treatment, of passing some antiseptic solution through the probe, they had found to cure many severe cases. They had had, indeed, surprisingly good results from this method of treatment.

Dr. Noyes, New York, said he employed every single method that any gentleman present had spoken of, including Dr. Theobald's.

Dr. Theobald then replied to the discussion. First noticing the observations of Dr. Roosa, he said he did not compare the good results of which he spoke with the bad results which he himself had obtained with small probes. The comparison was with the bad results which the recent literature of the subject showed that other men obtained. In regard to Mr. Swanzy's question as to the curve of the probe, he held in his hand a probe which had been in use in his hands for a number of years and the curve of which he had found most satisfactory.

As to Dr. Thompson's inquiry regarding the frequency with which these cases recur, he had mentioned in his paper, which he had not had time to read in full, that they did recur, but only rarely. He did not mean to say that he had not cases of recurrence, but they were in a very small minority. As to Dr. Risley's statement that the use of those large probes destroyed the physiological action of the tube, he found that the physiological action of the tube to carry the tears was not destroyed, even when the air was blown up into the eyes in the effort of nose-blowing. Mr. Priestly Smith had asked as to the frequency with which the probes were used. These points were brought out in the latter part of his paper which he had not had time to read. He never probed an eye oftener than every other day, and then only when the size of the probe was being increased. If the eye would stand the probe every other day, he preferred to probe it that often, and as a rule he found that was quite practicable. Later on, when he had reached the largest size of probe which it was necessary to use, the intervals were gradually increased—first to two, three or four days, then to once a week, or once in two or three weeks, and finally at intervals of a month. When three or four such intervals had elapsed and no tendency to recurrence was observable, he discharged these cases as cured. He had mentioned in his paper that he had seen some of those cases for years afterwards and there was not the slightest tendency to return.

The President said that probes quite as large, or about as large as those that had been passed round by Dr. Theobald were introduced into practice eighteen years ago by Mr. Couper, of London: so that he thought the credit, such as it was, of employing very large probes should go to the original introducer.

STHENIC AND ASTHENIC ORTHOPHORIA, AND STHENIC AND ASTHENIC HETEROPHORIA.

By G. C. SAVAGE, M.D.
Prof. Ophthalmology in Medical Department of Vanderbilt University, Nashville, Tennessee.

There is such a condition as lateral orthophoria in which neither the interni nor externi are sufficiently strong; there is also such a condition as vertical orthophoria in which both the superior and inferior recti are weak. Of the former we had something to say at the last meeting of the American Medical Association (Baltimore, 1895); we have known of the existence of the latter since November, 1895. Since there are two kinds of orthophoria it seems necessary to have terms for distinguishing them. Sthenic orthophoria would aptly describe the form in which the muscle balance is in strength, while asthenic orthophoria would apply to that form in which the muscle balance is in weakness. It is evident that only asthenic orthophoria should receive any consideration from a therapeutic standpoint.

As there are two kinds of orthophoria, there are also two forms of heterophoria, the sthenic and the asthenic, the one being easily distinguishable from the other, and each requiring its own proper therapeutic procedure.

Sthenic Orthophoria.

This condition is not often encountered though it occurs more frequently than the asthenic form. In lateral orthophoria of the sthenic type the externi are found to balance the interni in both the far and near tests, and abduction is 8° or more. These conditions found, there is no need for testing the adduction; nor does there exist an indication for the application of any therapeutic law to the lateral ocular muscles.

Sthenic orthophoria as applied to the vertically acting muscles is determined by the balancing of these muscles in the distant test, associated with a deorsumduction of 3° or more. This condition when found cannot be made better, for it is already perfect.

ASTHENIC ORTHOPHORIA,

As applied to the lateral muscles, manifests itself by a low abduction (less than 8°) associated with a balancing of these muscles in both the far and the near tests. Finding the externus weak, although capable of balancing its opposing muscle, it at once appears that the internus, too, must be weak. The lower the abduction in this condition the worse is the case. We have at our command two methods of treatment either one of which, or both combined, will bring great relief to the patient. The first method consists of prismatic exercise of both the interni and the externi. The most convenient arrangement of such prisms is that suggested by Dr. George H. Price, about two years ago, viz., prisms put in ordinary spectacle frames like Franklin divided lenses, the upper prisms with bases in, the the lower with bases out. Since the indication, in lateral asthenic orthophoria, is to add equally to the tonicity of the externi and the interni, the prisms in the upper part of the rim should be of the same strength as those in the lower. The objects to be looked at during the period of exercise should be a candle, lamp or gas-jet, placed twenty feet from the patient, and a card with a dot or cross mark on it, to be held in the hand. Viewing the light through the upper prisms the externi are made to contract so as to effect binocular single vision, while looking at the mark on the card through the lower prisms calls into action the interni. The light and the dot are fixed alternately every five seconds, and thus is excited rhythmic contraction and relaxation of the lateral muscles. The exercise should be continued five or ten minutes, and should be repeated twice or oftener in the twenty-four hours. The prisms used need never be stronger than 4°, and as in the heterophoric condition, it would be better to commence with weaker prisms.

The other method of exercising these muscles is the synchronous moving of the eyes in the horizontal plane to the right and left alternately, fixing for only a moment some object previously placed on the wall for the purpose. Since this will usually be done in a room it might be named the wall-to wall exercise. The point of view should be changed from side to side every few seconds, and the exercise should be continued five to ten minutes, but should always be stopped short of fatigue. Two ways of modifying the treatment, in the beginning, so as not to excite fatigue, would naturally suggest themselves :—the one, looking far to the right and left for only a short while; the other, looking only a little way to the right and left for several minutes. In the one, the time should gradually be increased; in the other, the arc to be described by the visual axes must be gradually extended to the utmost capacity of the binocular sweep. In any case, either method alone would serve to add strength equally to the muscles exercised; both methods might be combined in any case with profit, the patient being directed to resort to the wall to-wall exercise every morning and the prismatic exercise in the evening. As the treatment progresses the abduction should be tested at intervals of a few weeks, and when this reaches 8° there is no further indication for treatment.

ASTHENIC VERTICAL ORTHOPHORIA

Was first noticed by the writer in November, 1895. The first patient was astigmatic and had slight exophoria in the near, with abduction of 8°. There was no hyperphoria. Her focal error was corrected and her exophoria in the near responded readily to rhythmic exercise. Her eyes were still incapable of comfortable near-work, for which there seemed to be no explanation. A statement by the patient divulged the secret of her trouble. She said if she should hold a book or paper on a level with her eyes she could read with a fair degree of comfort. It at once appeared that, while there was vertical orthophoria, there was, nevertheless, weakness of the superior and inferior recti of both eyes. The strength test confirmed the suspicion, for her sursumduction and deorsumduction were less than 1°. Looking either up or down was fatiguing. The condition found, the remedy was at hand in the

CEILING-TO-FLOOR EXERCISE

of the superior and inferior recti. The patient was directed to stand near one wall of a room of usual size, and to select some mark on the ceiling near the opposite wall for upward fixation, at the same time placing a piece of coin, a thimble or some other object on the floor, four feet in front of her, for downward fixation. Standing erect with head set as for vision straight ahead, she was directed to look at the chosen mark on the ceiling for a moment and then at the object on the floor, alternating from the one to the other every two or three seconds, for a length of time short of fatigue. She was directed to repeat the exercise two or three times a day, never longer than ten minutes at a time. Her improvement began at once and has progressed satisfactorily. Within two weeks her sursumduction and deorsumduction were 2°. There can be no doubt that her improvement was a *propter hoc* and not a *post hoc*. The treatment was rational; it proved efficient. Several similar cases of less severity have been observed, since the first one, and have been benefitted by the ceiling-to-floor exercise.

Prismatic exercise of the superior and inferior recti could be easily resorted to, the prisms being of the same strength, their axes vertical and their bases towards each other in the rims, after the style of the Franklin divided lenses. By slightly elevating and lowering the frame the patient could be made to look at a light across the room alternately through the upper and lower prisms. This raising and lowering of the frames should be rhythmic. The prismatic exercise cannot surpass, if equal, the ceiling-to-floor exercise.

Asthenic vertical orthophoria may coexist with a similar condition of the lateral recti muscles, and often does complicate an asthenic exophoria. In either case a part of the treatment should be a combination of the ceiling-to-floor and the wall to-wall exercise, changing from the one to the other every half-minute or minute, thus continuing for ten or more minutes.

STHENIC AND ASTHENIC HETEROPHORIA

Are not products of the imagination, but they have an actual existence, the importance of which, from a therapeutic standpoint, should not be ignored. To confound them in diagnosis is to err in treatment.

STHENIC EXOPHORIA

Is a common condition and may be readily determined. The phorometer shows exorphoria, in both the far and the near tests; and abduction is 8° or more. The plan of treating these cases must be decided upon after carefully weighing the results obtained by both the phorometer and the abduction. However great may be the exophoria far and near, if the abduction is 8° nothing should be done to the externi. A partial tenotomy would do harm and any exercise of these muscles would only increase the trouble. Attention should be given only to the interni. Much may be accomplished by rhythmic exercise, oy means of the exophoric set of prisms; or by looking at a lighted wax candle as it is moved from arms length to within six inches of the eyes, following this at once by looking at some distant object, repeating the process several times at each sitting; or by the method of using strong prisms, advocated by Gould. The success of either of these plans, or of all combined, will depend on the quantity of the exophoria and on the age of the individual patient; the smaller the error and the younger the patient the more rapid will be the cure. Failing to cure with the exercise, only one thing remains to be done, viz. shortening or folding one or both interni. After this operation, if a small part of the old error remains uncorrected, the exercise treatment may be resumed with the prospect of completing the cure.

If, in a case of sthenic exophoria, the abduction is more than 8°, another indication for treatment presents itself. This indication is for a partial tenotomy of one, or both externi, and this should be done without temporizing with any method of exercising the interni. The operation should be so carefully done as never to reduce the abduction below 8°. Often a partial tenotomy of both externi will produce the desired result, the establishment of sthenic orthophoria. Failing in this, rhythmic exercise of the interni will complete the cure in many cases, though occasionally the interni must be strengthened by shortening one or both. In the management of these cases we have at our command partial tenotomies of the externi, rhythmic exercise of the interni, and shortening of the interni.

ASTHENIC EXOPHORIA.

In this condition the phorometer will show exophoria, in the far and near tests, associated with abduction less than 8°. In these cases the abduction sometimes falls as low as 3°, and frequently will be as low as 5° or 6°. In the management of these cases a partial tenotomy of the externi can do only harm; and the shortening of the interni is of doubtful propriety. The former operation will never have to be done; the latter may become necessary, but in these cases it becomes a matter of great delicacy. Two methods of exercise should be resorted to daily in these cases, their conjoined use promising the greatest good. The first is rhythmic exercise of the interni by means of the exophoric set of prisms; the second is the wall-to-wall exercise of both the interni and the externi, as advised for the management of asthenic orthophoria.

In the beginning of our study of this condition two years ago, the patient was directed to place the prisms for exercising the interni, at one time in the twenty-four hours, and at another time placing them for the exercise of the externi. Out of this method grew Dr. Price's double prism arrangement for exercising all the lateral muscles at the same sitting. This is a device of no mean merit.

It was, doubtless, in cases of asthenic exophoria that Dr. Park obtained his good results from having his patients look from side to side, as set forth in his paper read before the Section of Ophthalmology, A. M. A., at Baltimore, May, 1895. Certainly this method could do no good in cases of sthenic exophoria.

STHENIC ESOPHORIA

Is not so common as sthenic exophoria. The phorometer shows esophoria, in the far and near tests, and the adduction is 40° or more. While partial tenotomies of the interni may become necessary in order that these cases may be cured, other means ought first to be tried, except in cases with a high degree of the error. The other available means are, first the full correction of a coexisting hypermetropia, with or without astigmatism, thus curing the pseudo-esophoria; second, the rhythmic exercise of the externi by means of the esophoric set of prisms. This failing, a partial tenotomy of the interni should be done, if adduction is above the normal; while shortening of the externi should be done if adduction is only normal. After either of these operations has been done, if only a small quantity of the original error remain, the cure may be completed by rhythmic exercise of the externi. In the higher errors, the operator may have to perform a partial tenotomy on both interni, and make a shortening operation on both externi, and then find something for rhythmic exercise to accomplish.

ASTHENIC ESOPHORIA.

In this the phorometer shows esophoria in the near and far tests, and the adduction is below normal. In discussing sthenic esophoria we have placed the normal adduction power at 40° which cannot be far from right. The adduction in asthenic esophoria may drop as low as 20°, but in most cases that have been observed it has been between 30° and 40°. A low adduction in esophoria is necessarily associated with very low abduction which should be tested. The treatment of this condition should be by means of gymnastic exercise alone, at least for a long while; and at no time should an operation on the interni be considered. Each of two kinds of exercise should be resorted to once or twice a day. The externi should be exercised by the esophoric set of prisms; and both the externi and the interni should be exercised by the wall-to-wall method. These failing to accomplish all we would desire, a shortening of one or both externi should be done. The object of the shortening would be the production of asthenic orthophoria which must be cured by the wall-to-wall exercise or by means of the double prisms. In asthenic esophoria, a partial tenotomy of an internal rectus would result in harm, and should never be done.

STHENIC HYPERPHORIA.

In this, the phorometer shows the hyperphoric condition to exist and measures its quantity. There is in these cases a sursumduction of the hyperphoric eye and a deorsumduction of the cataphoric eye of 3° or more. In those cases in which the sursumduction of the hyperphoric eye is only 3°, the normal, the treatment should be by exercise alone, to be accomplished by the use of the hyperphoric set of prisms. A tenotomy of the superior rectus of the hyperphoric eye would give quick, but temporary relief; but if an operation is to be done at all in these cases, it should be the shortening of the inferior rectus of the hyperphoric eye. A muscle that has only the normal amount of intrinsic strength, as shown by the duction test, should be allowed to retain it.

In cases of sthenic hyperphoria with deorsumduction of more than 3°, the first indication is a partial tenotomy of the superior rectus of the hyperphoric eye, but it should be done so as not to reduce its duction power below the normal. If there still remains a good deal of the hyperphoria, and the deorsumduction of the cataphoric eye is 4° or more, a partial tenotomy of its inferior rectus may be done, but it would probably be better to do a shortening operation on the inferior rectus of the hyperphoric eye. One or more operations having been done, whatever hyperphoria may remain should be cured by means of the hyperphoric set of prisms.

ASTHENIC HYPERPHORIA

Is a very common condition. The degree of hyperphoria shown by the phorometer is not great, rarely more than a ½, while the sursumduction of the hyperphoric eye and the deorsumduction of the cataphoric eye are below the normal, often as low as 2° and sometimes not being more than 1°. Only exercise of the superior and inferior recti should be considered in these cases. Each of two methods should be resorted to once or twice a day. At one sitting the inferior rectus of the hyperphoric eye and the superior rectus of the cataphoric eye should be exercised by means of the hyperphoric prisms; the next exercise should be of all the vertically acting muscles by means of the ceiling-to-floor method. The object of the prism exercise is to develop the condition of asthenic vertical orthophoria, while the aim of the ceiling-to-floor exercise is to convert the asthenic into sthenic vertical orthophoria.

Esophoria in the far and exophoria in the near is always an asthenic condition and should be treated by prismatic exercise and by the wall-to-wall method. The prism exercise should be by means of the Price double prisms, those above to be half the strength of those below. The aim in view, when using the prisms, is the development of asthenic lateral orthophoria, while the wall-to-wall exercise is to convert the asthenic, into sthenic orthophoria. No operation should ever be done on these cases.

THE REFRACTIVE CONDITION OF 190 TRACHOMATOUS EYES.

By E. E. HAMILTON, Wichita, Kansas

A perusal of the literature of modern ophthalmology, to an unprejudiced observer, shows an increasing tendency on the part of its practitioners to recognize and correct low refractive errors, particularly astigmatism. This is especially true of astigmatic errors where the meridian of greatest curvature is horizontal or oblique, or where the meridians of greatest ametropia are unsymmetrically disposed toward each other in the two eyes.

The emmetropic eye is being regarded more and more as the ideal eye, and the one nearest approaching perfection; all departures from it as imperfections of nature which, even though slight, often demand our attention because of uncomfortable symptoms their presence entails.

If this be true of an eye having no pathological changes present either in its structure, or that of its appendages, how much more ought it to be true in the presence of an irritated and inflamed conjunctival membrane!

We are enjoined to put the eyes in a condition of physiological rest in the presence of chorio-retinal irritation. There seems at least an equal necessity for the same treatment in the condition with which we have now to deal.

Trachoma is regarded as a contagious disease, the development of which requires two conditions:

1. A specific germ.
2. Its contact with the conjunctiva.

If the contagion is virulent, the disease may be compatible with perfect health of body and eyes, but a congested, unhealthy membrane obviously furnishes a better soil for germ development, as its resistent powers are thus lessened.

Such a condition may be favored by bad hygiene, lowered body vitality, irritating effects of impure air, dust, tobacco, etc., but we have another factor favoring successful germ invasion in uncorrected refractive errors.

Conjunctival congestion is one of the most frequent symptoms of asthenopia. This congestion, plus the invading specific germ is almost sure to develop the disease in question.

If we have present the disease in active progress, besides the indications for local treatment, is the removal of deleterious influences favoring irritation. Not among the least of these, in my judgment, is the correction of any refractive error liable to cause conjunctival irritation. Correct, and correct early, these imperfections, preferably under the prolonged mydriasis of atropia, both for its more complete cycloplegic effect, and the ciliary rest given by this drug.

Under such a correction, the disease will respond more kindly to treatment, and the liability of aggravating and damaging relapses will be reduced to a minimum.

It has seemed to me that writers on ophthalmic subjects have failed to give the subject of refractive errors, in the presence of trachoma, the attention its importance demands. Being interested in this direction, I have carefully examined the eyes of 100 trachoma patients, the results of which I have thought would prove instructive to the profession as they have to myself.

The so-called follicular conjunctivitis I have rejected, not considering it necessarily contagious. All cases examined may be classed as papillary or lymphoid, usually both forms of hypertrophy being present at the same time in the same case.

The average time of treatment has been about two months.

Most of them were examined subjectively under mydriasis, the results being confirmed, as near as possible, with the shadow test.

My 100 cases represented 190 eyes, ten of the number having each one blind eye. 161 or 80 per cent. were hypermetropic either in one or all meridians, while three or 1.9 per cent. were hypermetropic in one meridian and myopic in the opposite.

19, or 11.8 per cent. were myopic in one or all meridians.

7, or 4.3 per cent. were emmetropic.

Of the 161 eyes of hypermetropic refraction, thirty-five had simple hypermetropia, forty-one simple hypermetropic astigmatism, and eighty-five compound hypermetropic astigmatism.

Of the nineteen eyes of myopic refraction, seven were the same in all meridians, seven were myopic in one meridian only, while five had compound myopic astigmatism.

The thirty-five simple hypermetropic eyes varied in degree from 1.00 D. to 8.00 D., the average being about 2.50. The eyes having axial errors only, are not considered of unusual importance and are not recorded, while those having corneal imperfections are recorded as follows:

Cases of simple hypermetropic binocular astigmatism:

Mr. C., age 24, R. E. 1.50 ax. 90.° L. E. .50 ax. 90.°
Master K., age 7, B. E. 2.00 ax. 90.°
Mrs. N., age 52, R. E. .50 ax. 90.° L. E. .25 ax. 90.°
Mrs. W., age 39, R. E. 3.75 ax. 180.° L. E. 3.00 ax. 180.
Mrs. F., age 29, R. E. .50 ax. 135.° L. E. .50 ax. 30.°
Mr. T., age 40, B. E. .50 ax. 180.°
Miss P., age 9, B. E. .50 ax. 180.°
Master R., R. E. .50 ax. 60.° L. E. .50 ax. 120.°
Mr. M., age 21, R. E. .50 ax. 150.° L. E. .50 ax. 180.°
Miss P., age 20, B. E. .50 ax. 180.°
Miss S., age 19, B. E. .50 ax. 180.°
Miss T., age 7, R. E. 1.00 ax. 90.° L. E. 2.00 ax. 90.°
Miss C., age 17, B. E. 3.00 ax. 90.°
Master C., age 9, B. E. 1.00 ax. 180.°

Mr. B., age 19, B. E − .50 ax. 180.°

Mr. B., age 35. R. E. .50 ax. 120. L. E. .25 ax. 60.

Mr. C., age 19, R. E. 1.00 ax. 135. L.E. .50 ax. 90.

Master F., age 7, B. E. 3.00 ax. 90.

Mr. J., age 35, R. E .25 ax. 180. L. E. .50 ax. 180.

Cases of compound, binocular, hypermetropic astigmatism

Miss R., age 15, R. E. 4.50○ 2.00 ax. 45. L. 1.75○ .75 ax. 150.

Miss P., age 11, R. 1.00○ .25 ax. 90. L. .50○ .25 ax. 90.°

Miss F., age 23, R. 1.50○ .50 ax. 180. L. 1.25○ .50 ax. 180.

Miss W., age 35, R. 1.50○ .25 ax. 180.° L. 1.00○ .25 ax. 180.

Dr. M., age 42, R. 1.00○ .50 ax. 180. L 1.00○ .50 ax. 180.°

Mrs. B., age 34, R. 1.50○ .50 ax. 180. L. 1.00○ .50 ax. 135.

Mrs. K., age 60, R 2.75○ .50 ax. 60. L 2.75○ .50 ax. 90.

Miss G., age 13, B. E. 2.50○ .50 ax. 90.

Mr. F., age 21, R. 1.00○ .50 ax. 90. L. 1.00○ .25 ax. 90.

Mr. P., age 40, R. 1.50○ .50 ax. 45. L. .50○ .50 ax. 180.

Mr. A., age 31, B. E. 1.50○ .75 ax. 180.

Miss G., age 15, B. E. 1.00○ .25 ax. 180.

Mr. M., age 40, B. E. .50○ .50 ax. 90.

Master W., age 11, B. E. 1.00○ .25 ax. 180.

Master X., age 13, R. 1.00○ .25 ax. 180. L. 1.00○ .25 ax. 135.

Mr. X., age 50, B. E. .75○ 1.00 ax. 180.

Mr. V., age 20, B. E. 1.00○ 2.00 ax. 90.

Mr. S., age 22, R. .50○ .25 ax. 45. L. .50○ .25 ax. 135.

Mrs. G., age 30, R. .50○ .50 ax. 150. L. .50○ .50 ax. 30.

Miss B., age 15, B. E. + 2.00⊃+.50 ax. 90.°

Miss C., age 24, R.+ 1.25⊃+.50 ax. 90.° L.+.50⊃+.50. ax. 105°

Miss C., age 18, R. +2.50⊃+.75 ax. 90.° L.+ 2.25⊃+.50 ax. 90.°

Miss N., age 18, +.50⊃+.50 ax. 90°. L.+ .50⊃+.25 ax. 90.°

Miss A., age 19, .50⊃+1.25 ax. 135.° L.+.50⊃+.50 ax 90.°

Miss C., age 10, B. E. + 1.00⊃ + .50 ax. 90.°

Miss C., age 20, B. E.+.50⊃+ .50 ax. 90°.

Miss H., age 30, B. E. +.50 +.50 ax. 180.°

Master K., age 9, R. + 1.50⊃ + 2.75 ax. 120.° L. + 1.50⊃+2.75 ax. 60.°

Miss L. age 26, R. + 1.50⊃ + .75 ax. 90.° L. 1.50⊃+.50 ax. 90.°

Miss C., age 25, R. + 4.75⊃+ .75 ax. 60.° L. + 4.50⊃+.75 ax. 120.°

Mr. M. age 34, B. E. + .50⊃ + .25 ax. 180.°

Master S., age 8, R. + 1.50⊃ + 3.25 ax. 90.° L. + 1.50⊃ + 3.25 ax. 105.°

Mr. L., age 40, B. E. + 1.25⊃ + .50 ax. 60.°

Mr. M., age 60, R.+1.00⊃+ .50 ax. 135.° L. + 1.00⊃ + .50 ax 15.°

Miss M., age 24, R. + 3.25⊃ + .75 ax. 180.° L. + 2.50⊃ + 1.2 ax. 150.°

Master C., age 12, + 1.50⊃ + .50 ax. 90.° L. + 1.25⊃ + .25 ax 90.°

Mrs. P., age 60, B. E., + 1.25⊃ + .50 ax. 180.°

Mr. D., age 30, R. + 1.00⊃ + .50 ax. 120.° L. + .50⊃+.25 ax 90.°

Cases of simple, binocular, myopic astigmatism:

Mr. C., age 57, B. E.—4.00 ax. 90.°

Mr. J., age 19, B. E.—2.50 ax. 180.°

Cases of compound, binocular, myopic astigmatism.

Mr. H., age 14, B. E.—3.00○—1.00 ax. 90.°

Miss B. age 17, B. E.—1.00○—.50 ax. 180.°

Cases requiring differently ground glasses for each eye:

Mr. B., age 54, R. +1.00 sph. L.—1.50 ax 180.°

Miss B., age 19, R. +1.00 ax. 90.° L. +1.00 sph.

Miss B., age 46. R.—1.00○—.50 ax. 90.° L. +.50○—1.50 ax. 180.°

Mr. W., age 49, R. +2.00○+.50 ax. 180.° L. +3.00 ax. 90.°

Mr. M., age 55, R.—1.50 ax. 90.° L.—1.00 sph.

One patient was emmetropic in one eye and astigmatic in the other. (Miss W., age 20, R. +1.00○+.50 ax. 90.° L. emmetropic.)

Of 63 patients having astigmatism in both eyes, 23, or 36.5 per cent., were with the rule; and 20, or 32 per cent., were against. 8, or 12.7 per cent., had oblique axes symmetrically placed, while 11, or 17.4 per cent., had one or both axes oblique, but unsymmetrically placed.

Of the cases having oblique, and unsymmetrically placed axes, 4 required cylinders with vertical axes, while the axes of the fellow eyes were oblique; 4 cases had horizontal axes, their fellows being oblique; one had asymmetrical, oblique axes, but not parallel, while one had asymmetrical axes, oblique and parallel.

One case had axes placed at right angles, one at 90° and the other at 180.°

Of the 10 cases representing ten eyes, 8 were hypermetropic, and 2 myopic in refraction. One was hypermetropic alike in all meridians (+1.00); three were hypermetropic in one meridian only (+1.50 ax. 90,° +2.00 ax. 180,° and +1.00 ax. 180°). 4 were hypermetropic in all meridians, but more in one than the others, as follows: (+1.00○+.50 ax. 180,° +.50○+.50 ax. 180°, +8.00○+2.25 ax. 45,° and +4.00○+1.25 ax. 90°).

Of the two cases (2 eyes) having myopic refraction, one was myopic in one meridian only, (—4.00 ax. 180°) and one was myopic in all meridians, but more in one than the others (—3.50⌢—2.25 ax. 135°.)

The reader will not fail to notice the number of astigmatic cases with oblique axes, particularly the frequency of oblique axes unsymmetrically placed with reference to each other.

The unusual frequency of eyes having least refractive power in their vertical meridians, will also be noticed.

These are comparatively uncommon varieties of astigmatism, requiring undue efforts of the ciliary muscle to correct. They may very properly, I think, be styled asthenopic errors.

Several anisometropic cases were found, the correction of which so often puzzles the refractionist.

I am aware 100 cases do not establish a theory. but so far as they go they are of interest, in that they suggest that eyes having refractive conditions favoring asthenopic symptoms, such as conjunctival congestion and inability to sustain any prolonged accommodative efforts, are most liable to contract trachoma.

Perhaps the frequency of unusual axes is a mere coincidence. I am strongly inclined to the opinion, however, that further investigation in the same direction, will afford further confirmation of the theory that eye-strain is decidedly a predisposing factor favoring the development of trachoma.

127 N. Market Street.

INFILTRATION ANESTHESIA IN OPHTHALMIC PRACTICE

By H. V. WURDEMANN, M.D., Milwaukee.

Solutions advocated in the paper read at Baltimore, last May, were as follows:

R.	Cocaine mur.		20
	Morph. mur.		025
	Natr. Chlor.		20
	Aq. Dest. ad	100	

M. Sterilisat. adde. sol. ac. carbol. 5 per cent. gtt. ij.

S. Solution No. 1. strong. For operation upon highly inflamed or hyperesthesic areas.

R.	Cocaine mur.		10
	Morph. mur.		025
	Natr. Chlor.		20
	Aq. Dest. ad	100	

M. Sterilisat. adde. sol. ac. carbol. 5 % gtt. ij.

S. Solution No. 2. medium. For most operations.

R.	Cocaine mur.		01
	Morph. mur.		005
	Natr. Chlor.		20
	Aq. Dest. ad	100	

M. Sterilisat. adde. sol. ac. carbol. 5 % gtt. ij.

S. Solution No. 3, weak. For superficial operations upon nearly normal tissues.

Parke Davis and Co., and Wyeth and Bro., make infiltration tablets for extemporaneous preparation. The efficacy of the anesthetic fluid is also increased by cooling. From the minuteness of the doses employed it is evident that the resulting anesthesia is not due to any great extent to the physiological effect of the narcotic drugs, but to the application of the solution *into* instead of under the skin, thereby replacing the normal fluids of the tissues by a fluid of less specific gravity which causes anemia, compression, and cooling; thus producing a temporary paralysis of the nerve filaments.

If the operation last longer than 20 minutes the infiltration must be repeated.

By cooling the spot selected for the formation of the first wheal by ether or rhigolene spray, or touching mucous membrane with cocaine solution, the first injection may be made without feeling even the prick of the needle. It must be remembered that the anesthesia exists only throughout the extent of the edema produced by the infiltration, but any tissues of the body may be anesthetized that can be thus artificially edematized. Painless operations have been performed from ovariotomies and amputations, down to the opening of boils and felons, circumcisions, lid operations, excision of tumors, etc.

Infiltration anesthesia is particularly valuable in ophthalmic work when incision through the skin is required, where cocain instillation is applicable, or where the operation is too trivial for chloroform or ether.

MADISON, WIS., January 10, 1896.

DR. G. C. SAVAGE, Nashville, Tenn.

Dear Sir: I have enclosed the original models of my Pupilometer which are to be used in a trial frame at axis 90°, directing patient to look at some object held between the eyes of operator at reading distance with left hand, and with right hand adjusting the pupillary distance on trial frame until the wire of pupilometer is over the center of each pupil, when the pupillary distance is obtained, and by the reading on cross bar of trial frame the exact pupillary distance is registered. For distance, instead of having patient look at an object between your eyes, request him to look over your head in the distance when by the screw adjustment as stated above on trial frame, the P. D. for distance is obtained. I have used this little device for the past year, and am so well pleased with it that I have had a substantial set made by Geneva Optical Co., of Chicago. I consider this device as original with me, and if you think it will interest the readers of the OPHTHALMIC RECORD please publish it. Very truly, W. C. ABALY.

THE

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SARCOMA OF THE CHOROID, GLIOMA OF THE RETINA AND NEW FORMED BLOOD VESSELS IN THE VITREOUS.

By L. WEBSTER FOX, M.D.,

Professor of Ophthalmology, Medico-Chirurgical College, Philadelphia, Pa.

The following interesting cases presented themselves at the Clinic of the Medico-Chirurgical Hospital during the past year.

Mrs. C. J., age 53, Germantown. About last March or April the patient had a slight conjunctival inflammation, which lasted for a week or two. During this period she noticed an apparent line encroaching upon her vision. She consulted a surgeon, who made a cursory examination of the exterior part of the eye, he could see nothing but the conjunctivitis. After consulting several ophthalmic surgeons for this encroachment of blindness, she then came to the Medico-Chirurgical Hospital. I discovered that she had good lateral and lower vision—the upper field very markedly contracted. The external part of the eye was normal in appearance—the pupil responded fairly well to light with a shade of dilatation, and possibly less active than the left iris. The tension was a shade less than normal, a common occurrence in the early stage of detachments of the retina and new growths. The ophthalmoscope revealed an apparent detachment of the retina, when, however, I examined more closely into detail, I was doubtful of this diagnosis. The projection was situated in the lower and outer quadrant of the fundus, about the equator of the eyeball. The grayish blue retina had a rounded appearance. The blood vessels were full and ran backwards in straight lines instead of undulating curves, so characteristic of detachment. In this projection the line of demarcation between the normal retina and the separation was crescentic and a bluish base running with this curved line gave it the appearance of a rounded body. The line of separation in detatchment is usually more irregular and apparently the retina comes forward in undulating folds, the blood vessels are full and also undulating. In some cases they appear and disappear. Another differential point in the diagnosis was that in this projection of the retina it resembled a solid body, and the color was a mottled blue gray. In detachment, the retina usually has a semi-transparent appearance and the crests of the folds are of a silvery white shade, gradually fading into blue or gray color—depending somewhat upon the pigmentation of the individual.

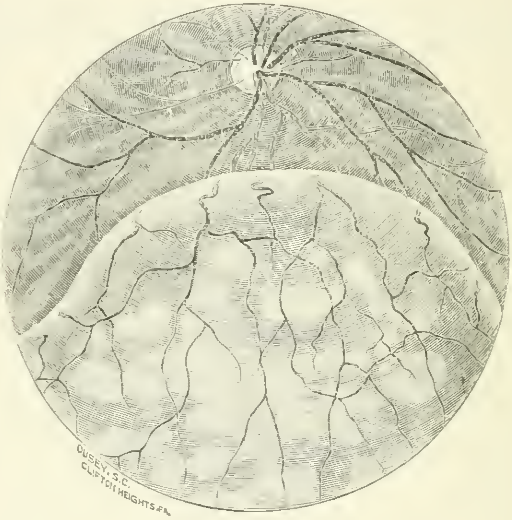

FIG. 1.
OPHTHALMOSCOPIC APPEARANCE.

To recapitulate—in this projection of the retina we had the appearance of a solid body with a distinct rounded outline, a mottled blue gray color—blood vessels full and running in straight lines and disappearing over the crest of the body—a well-defined space between the apex of the tumor and the still attached and normal retina. In a detachment of the retina we have the corrugated surface, a distinct blue and white color, blood vessels running in corrugated lines. No space between the normal attached retina and its detachment, and there is a concave or falling away from the line of demarcation.

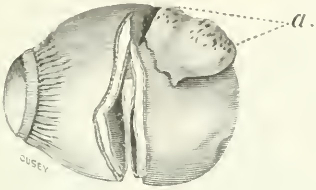

FIG. 2.

The picture in Sarcoma of the Choroid is one to make a permanent impression on one who is a student of detail. I must confess that the differential diagnosis between these two diseases is very difficult, yet in this case I did not hesitate to make the diagnosis at the first examination and explained to the students, who were present, why I felt positive of my diagnosis. I explained to the patient the gravity of her disease, and that the sooner the eyeball was taken out the better, yet insisted that she consult other ophthalmic surgeons and have their opinions. She took my advice, consulted at least six or seven of our leading surgeons, returned to the Hospital, October 25th, 1895, where in the presence of the class I removed the eyeball, cut it through the equator and turned it inside out. The growth stood out round, and about the size of a hazelnut. Fig. 2 gives a very good picture of it.

I separated the overhanging retina and the tumor stood out alone attached to the choroid.

The specimen was placed in Müller's fluid and microscopical sections were made by Dr. Alexander Klein.

Macroscopic appearance of tumor *a* in Fig. 2. Eyeball incised and turned inside out.

Tumor situated in the eyeground, rising abruptly on one side, and tapering gradually towards the surface on the other, projecting into the cavity of the eyeball, of irregular outline, dark brown in color, about 1 cm. long and 2½ mm. wide.

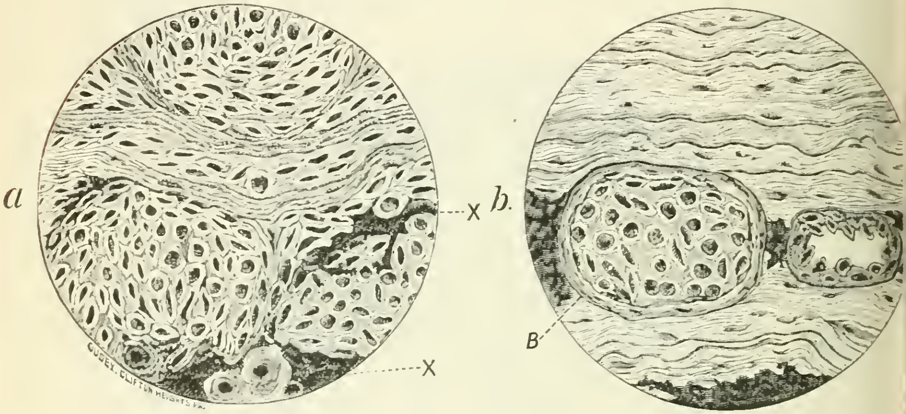

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FIG. 3.

On section the tumor was found to be a Melano–Sarcoma of the mixed variety, containing small spindle cells, round cells and giant cells, the spindle cells, however, greatly predominating, very rich in pigment and in places distinctly alveolar in structure.

The vessel walls, especially the adventitia, shared very remarkably in the cellular proliferation, the intima being roughened and the sarcomatous cells showing a tendency to invade the lumen of the veins. Indeed in one place, a large vein is entirely occluded by the sarcomatous mass, the thrombus reaching deep into the sclera. With this exception, the tissue of the latter does not appear markedly changed.

a. Section showing an alveolor structure. x. Pigment.

b. Section of sclera showing thrombus, consisting of sarcoma cells in a vein. B. vein. C. artery. D. giant cells.

The tissue of the retina over the tumor could not be made out, it having probably been destroyed by the sarcomatous mass. On both sides the choroidal cells were gradually lost in the growth. We have therefore to deal with a Melano-Sarcoma, originating in the adventitia of the blood vessels of the "Choroidea."

Sarcoma of the Choroid is a very rare disease. This is the second case which has come under my direct charge in thirteen years of active practice, and I believe I am within bounds, when I say that I have made upwards of fifteen thousand ophthalmic examinations during that interval. While Clinical Assistant at Moorefields Hospital, London, during a service of two years, I can recall two cases. Whilst there forty-six thousand new patients were entered on the Hospital books, but it is needless to say that a very insignificant number of these cases were examined with the ophthalmoscope, the conditions not calling for it.

My first case in this country was seen at the Germantown Hospital, nearly ten years ago. The patient, a German woman, 60 years old, consulted me for a partial dimness of vision in her right eye. Upon examination with the ophthalmoscope I found a round body, over which the retina had the appearance of being tightly drawn—the solid appearance and mottled gray color led me to believe that I was dealing with a Sarcoma of the choroid. The patient was kept under observation for some few weeks. The growth seemed to get larger—and the patient also felt that the visual field was contracting. I advised enucleation, which was performed in the Hospital, and a section made of the eyeball—a large round growth, filling up one-half of the vitreous chamber, was seen. A microscopical examination showed that the tumor was a Melano–Sarcoma.

About a year after this a very interesting case of new growth on the iris came to the clinic; it had the appearance of syphilitic gumma. I placed the patient upon mixed treatment, which, however, did not prevent the tumor from growing. I made an attempt at its removal by excising the growth with a part of the iris. The microscrope revealed that we had a pigmented Sarcoma to deal with. The wound healed without any secondary results, but the growth returned, and after filling the anterior chamber, I removed the whole eyeball. The tumor involved the ciliary bodies, and cells were also found in the choroid. The patient lived for three years and died in the Hospital of involvement of the liver, in all probability a Sarcoma, although no post-mortem examination was made.

All authorities agree upon it being a most malignant disease, and that sooner or later death ensues. When recognized, early enucleation may protect the patient, but the prognosis is always unfavorable.

Glioma of the Retina. Child two years old, referred by Prof. Isaac Ott, Easton, Pa., June 25th, 1895.

The mother of the little child noticed a peculiar yellow reflex from the left eye, and immediately called Prof. Ott's attention to it. The case was referred to me—upon examination concluded that it was a case of Glioma and advised immediate enucleation. The patient was taken to the Medico-Chirurgical Hospital and the eyeball taken out. I opened the eyeball by an incision through the equator and found the vitreous chamber filled with a white pultaceous mass, extending and filling up all the space back of the crystalline lens. Dr. Watson of the Histological Department made a microscopical examination and pronounced the specimen a true Glioma. The child made rapid recovery from the operation. I advised the father of the serious character and nature of these tumors, but up to the present time no untoward symptoms have developed.

About this time another child was referred to the Hospital by the late Dr. Gilbert from Chestnut Hill—with the same macroscopic appearance, the fundus filled by a pale yellow mass. The eyeball was removed and exactly the same condition was found as in the previous case—a Glioma. This child is three years old and is now wearing an artificial eye. There is no difficulty in putting the eye in place—the child wears it without inconvenience. On December 1st, when I last saw the child she was in excellent health.

A third case came under my care at the same time. I explained to the parents the serious character of the malady and advised enucleation—they left the Hospital and I have heard nothing further from them.

It is a strange co-incidence that in as many weeks I should see three cases of this very rare disease.

NEW FORMED BLOOD VESSELS IN THE VITREOUS.

Case 1.—Male, referred by Mr. Hall of the Blind Men's Home. He came to the Hospital for an ophthalmoscopic examination. He had sufficient vision in one eye to find his way about the streets. When testing his vision it was found that he could barely make out hand movement at three feet—in the left eye totally blind.

This patient gave a specific history, dating back ten years. Shortly after this his vision began failing and in spite of thorough treatment he is practically blind. Both pupils are semi-dilated, the right responds to light sluggishly, the left not at all. The ophthalmoscope shows slight traces of chronic hyalitis and the optic nerve and arteries over the fundus dimly outlined, spring from the head of the optic nerve, and floating forward into the vitreous, can be seen loops of new formed blood vessels—they have the peculiar spiral loops at their ends, not unlike those described by Jager in his Atlas, and similar to those cases described by Charnley and myself in the Royal London Ophthalmic Hospital Reports in 1882.

Case 2.—T. B., age thirty-five, gives a specific history, which dates back several years. At that time he was living in Ohio, and in January 1895 his eyesight grew dim, although he had no pain and the eyeballs did not become inflamed. During that time he had attacks of phosphenes, and a few weeks later many moats floating before his eyes. He went to Cincinnati under the care of a celebrated ophthalmic surgeon, who, recognizing the disease, placed him on active mercurial treatment, which soon brought about great improvement in his vision. He remained in Cincinnati for three months. Not being able to follow his occupation as a builder, which necessitated close inspection of plans and fine lines, he came on to Philadelphia under my care. During the interval of his leaving off treatment (having spent two weeks with friends before coming to see me) his eyes suddenly became worse. On his arrival he had only vision of $\frac{5}{200}$ in each eye. Upon learning his history and detecting hyalitis and probably retinitis, placed him upon active mercurial inunctions daily. Internally prescribed the mixed treatment. After getting the full effects of the hydrargyrum the vision improved to $\frac{20}{70}$ in the right eye, $\frac{20}{50}$ in the left eye in about six weeks. The range of vision continued for four weeks, as there was improvement and the treatment had to be discontinued he was placed under Dr. Faught's care for electrical treatment. The constant current was applied three times weekly with an excellent result—right eye $\frac{20}{30}$, left eye $\frac{20}{40}$.

After the clearing up by the electricity I found in the right eye four bunches of new formed blood vessels, all springing from the head of the optic nerve—two hanging downwards and seemingly, floating towards the nasal side into the vitreous. These blood vessels had the same spiral endings as described in my two previous cases.

The treatment by hydrargyrum brought the vision up to a certain range beyond which it was useless; by following this up with the constant current we were able still further to increase the vision. In certain forms of intraocular lesions, I know of no treatment so satisfactory as the constant current, properly applied. As to the formation of these new formed blood vessels in the vitreous I am convinced that the same process is involved that we find taking place on the cornea in pannus and in ulcers of the cornea.

1304 Walnut St.

THE ASSOCIATION OF HYPEROPIC REFRACTION AND HIGH NEAR EXOPHORIA, WITHOUT OTHER EVIDENCE OF WEAKNESS OF THE INTERNI.

By HIRAM WOODS, M.D.,
Associate Professor, Diseases Eye and Ear, University of Maryland, Baltimore.

That better understanding of lateral heterophoria will lead away from frequent tenotomies, and resolve itself into useful hints in refraction work, has long been with me a growing conviction. At the moment, the names of Drs. Norton, Savage, Casey Wood, Randall and Theobald, are recalled as among those who have either written upon or discussed this phase of muscular imbalance. Doubtless others have done so, while I know personally several competent men who were working upon principles, presented during the past few years, long before they appeared in print. It is chiefly from distance balance that these guides have been deduced. Important as they undoubtedly are, the near balance is not, I believe, without usefulness. Since Dr. Theobald's paper on "Subnormal Accommodation" in 1891, I have habitually taken equilibrium at reading distance. Theobald, it will be remembered, claimed as "normal," an exophoria of 3° to 5° at the near, as compared with distance balance. Less than 3° of near exophoric deviation from distance balance he thought indicative of excessive internus innervation produced by more than normal innervation of the ciliary muscle. This, in turn, he thought due to subnormal accommodative power; whether a weak ciliary muscle or inelastic lens. He looked upon this subnormal accommodation as a source of asthenopia in young persons. His contention that near exophoria of 3° to 5° is usual, is confirmed by Dr. Noyes, who says it cannot be considered abnormal. Normal or not, it is easily proved experimentally that this near exophoria is usual. Addition of convex sphericals increases it in E., and H., of concaves, diminishes it in M. Regarding near exophoria in the other direction,—*i.e.*, over 5°—Theobald gave as possible causes low degrees of internus insufficiency, myopia, and a hypersthenic ciliary muscle. In making the test I have found high near exophoria existing under conditions not covered by these causes. The refraction is hyperopic, and such symptoms as point to low internal insufficiency are wanting. These, I take it, are: latent exophoria at 20′, abduction at least of normal strength or slightly increased—7 to 9°,—and a far p.p. of convergence, associated with deviation on exclusion. Again, there seemed evidence that the ciliary muscle was not hypersthenic. There were the usual symptoms of ciliary relaxation and fatigue. H. was of low degree, and partly latent. After mydriasis and recovery of ciliary power most if not all of Hl. became Hm., and relief came from constant use of convex lenses. These are not, I think, symptoms of excessive muscular strength. At the same time there was high exophoria at 12″, which gradually decreased behind the lenses.

It will be well to study a moment the relation of ciliary and internus action in H. At infinity, with zero C., there must be, for clear vision, A. to the extent of refraction error. This internus suppression can be measured in metre angles by the H. in dioptries, and, if desired, readily converted into prism degrees. If from infinity to reading distance—say 12″—the relative innervation of the two muscles increases, pari pasu, near exophoria, converted into m.a.'s, should equal internus suppression at 20′, demanded by refraction error. Thus, a hyperope of 1D. should have near exophoria of 1m.a.,—very nearly seven prism degrees.

A word concerning the near balance test. With the eyes fixed upon an object at $\frac{1}{3}$ metre distance, there is in E. 3 D.'s A. If binocular vision be made impossible by a vertical prism, two to five degrees of exophoria is usually found, relative to balance at 20′. In comfortably working hyperopic, and in healthy myopic eyes, which have for sometime worked behind their full correction, the same proportion holds. A. in each instance remains at 3 D. in excess of its tension at infinity. This is zero in E. and corrected M., while in uncorrected H. it equals refraction error, unless effort for clear vision has been abandoned. Converting prism deviation into metre angles, it is seen that the usual C. innervation at reading distance measured by balance test, averages about 0.5 m. a., less than A. innervation in D.'s. To reach this point in H., C., starting from zero at infinity, must come within 0.5 m. a. of A. in D.'s. For example. In H. of 2D., A. is 2 D., while C. is zero. At $\frac{1}{3}$ M., where A. will be 5 D., C. innervation, in order to retain the usual relation must equal 4.5. m. a. In E. it must reach 2.5 m. a. That is, C. must be able to do independent work in H., not demanded of it in E. In some cases C. cannot overcome its suppression at infinity while A. acts; but a close proximity to the relation there established holds at reading distance. There is defective positive relative C. This is the condition I think shown by near exophoria in excess of the usual. It is, as a rule, accompanied by defective adduction at infinity; and when convex glasses are put on, at first increases on account of diminished ciliary stimulation. Later A. and C. learn to work in harmony behind correcting lenses, and near exophoria falls to the usual degree. At other times positive relative convergence must be developed by suitable exercise.

I am not unaware of a practical objection to this reasoning. If, in the example there is C. innervation to 4.5 m. a.'s., while A., working to 5.D.'s adapts the eyes for vision at $\frac{1}{3}$ metre, the hyperope must choose between indistinct and double vision. To

TABLE I.

SEX.	AGE.	WORK.	REFRACTION.	MUSCLES AT 20′.	MUSCLES AT 12″.	REMARKS.
1 M.	23	Student.	+0.25 C. 90° $\frac{20}{20}$ each.	Es. 1°. ab. 4°.	Exophoria 15°	Ad. 15°. By Gould's 44°.
2 M.	23	Student.	+0.5 C. 90 $\frac{20}{20}$ each.	Es. 5°. ab. 3°.	" 5°	
3 M.	23	Student.	$\frac{20}{20}$ each by Hm. +0.5.	Orth. ab. 5°.	" 12°	Ad. 12°. By Gould's 30°.
4 M.	25	Merchant.	$\frac{20}{15}$ each by +0.5 C. 180° R. 135° L.	Es. 1°. ab. 4°.	" 13°	Latent H. Could not use Homatropine.
5 F.	34	Reads for pleasure.	$\frac{20}{20}$ each by +0.75 S. ⌣ +0.75 C. 90°	Orth. ab. 7°.	" 7°	Homatropine. Ad. 10°. Gould's 30°. Accepted full correction.
6 M.	24	Merchant.	R. $\frac{20}{20}$ by +1. S. ⌣ +1.25 C. 30°. L. $\frac{20}{20}$ by +0.5 S. ⌣ +0.5 C. 100°.	Es. 2°. ab. 4°.	" 12°	Homatropine. No. H. became manifest.
7 M.	34	Merchant.	Each $\frac{20}{20}$ by +0.75 C. 180°.	Ex. 1°. ab. 5°.	" 10°	Ad. 20°. Gould's 35°. Severe headache.
8 F.	26	Lady.	Each $\frac{20}{20}$ by +0.75 C. 90.	Es. 1°. ab. 4½°.	" 15°	Ad. 9°. Gould's 24°. Homatropine. Accepted full correction.
9 F.	22	Lady.	Each $\frac{20}{20}$ by +0.75 S. ⌣ +0.25 C. 90°.	Ex. 2°. ab. 7°.	" 12°	Homat. Ad. 25°. Accepted full correction. P. P. of convergence 6½ cm.
10 F.	37	Lady.	R. $\frac{20}{20}$ by +0.5 S. ⌣ +0.75 C. 90°. L. $\frac{20}{20}$ by +0.5 S. ⌣ +0.75 C. 120°	Orth. ab. 6°.	" 7°	
11 F.	26	Stenographer.	R. $\frac{20}{20}$ by +0.5 S. ⌣ +0.5 C. 90°. L. $\frac{20}{20}$ by +0.5 S. ⌣ +0.25 C. 90°.	Orth. ab. 7°.	" 7°	Ad. 15°. Homat. Accepted full correction.
12 F.	18	Stenographer.	R. $\frac{20}{20}$ by +1. C. 90°. L. $\frac{20}{20}$ by +0.5 S. ⌣ +0.5 C. 90°.	Ex. 2°. ab. 6°.	" 11°	Headache, Sleeplessness. Ad. 12°. Gould's 24°, only after two weeks. Accepted full correction.

TABLE I. CONTINUED.

13 F.	29	Lady.	$\frac{20}{20}$ each by 1.5 S.	Orth. ab. 6".	"	8"	Homat. Accepted full correction. Ad. 16°. Gould's 35°.
14 M.	23	Physician	R. $\frac{20}{20}$ by 0.5 S. ⌢ 0.5 C. 130°. L. $\frac{20}{20}$ by 0.75 C. 45°.	Ex. 2". ab. 5".	"	14"	Ad. 10°. Homatropine. Accepted full correction. Had been wearing, R.—0.5 C., 150°: L. 0. 5 C., 30°.
15 M.	21	Chemist.	Each $\frac{20}{20}$ by 1 S. ⌢ 0.25 C. 90°.	Orth. ab. 5".	"	17"	Homat. Rejected Sp., after recovery from Mydriatic. Ad. 12°. Gould's 38° in two weeks. Then near Ex. 2½°. Asthenopia relieved. Had P.P.C. 10cm from beginning.
16 M.	30	Physician	R. $\frac{20}{20}$ by − 0.25 C. 60°. L. $\frac{20}{20}$ by 0.25 C. 120°.	Ex. 1". ab. 4".	"	9"	P. P. Conv., 10 cm. Cyls. have given relief for one month.
17 F.	27	Lady.	Each $\frac{20}{20}$ by − 0.75 Sp.	Orth. ab. 5".	"	9"	Ad. 22°. P. P. Conv. 8 cm. Homat. Accepted full correction.
18 M.	23	Student.	R. $\frac{20}{20}$ by 0.5 S. L. $\frac{20}{20}$ by 0.5 C. 90°.	Ex. ½" ab. 3".	"	9"	Latent H., about 1.5D. P. P. C. 7½ cm. No time for Mydriatic.
19 M.	23	Student.	R. $\frac{20}{20}$ by 0.5 C. 180°. L. $\frac{20}{20}$ by 0.25 C. 60^{8}.	Ex. 1". ab. 5½".	"	8"	Ad. 17°. P. P. Conv. 6 cm.
20 F.	19	Lady.	R. $\frac{20}{20}$ by 1. S. ⌢ + 0.25 C. 90°. L. $\frac{20}{20}$ by 1. S. ⌢ 0.5 C. 90°.	L. Hyp. Ex. ½"—1" ab. 6".	"	12"	Homat. Accepted full correction.
21 M.	21	Dentist.	R. $\frac{20}{20}$ by 2.5 S. ⌢ + 0.5 C. 90°. L. $\frac{20}{20}$ by 2.25 S. ⌢ 0.75 C. 90°.	Ex. 2". ab. 6".	"	9"	Ad. 32°. Accepted full correction. Was wearing each, + 1.5 S. ⌢ 0.5 C., 90°.

secure clear binocular vision, he must alter the emmetropic relation between A. and C. He can do this only by having at his disposal a reserve fund of relative A. and C. The former he must use at infinity. The near balance test discovers whether or not he possesses the latter. That he needs it is, I think, shown by these clinical observations:

1. When H. is known to exist but gives no discomfort, near exophoria approaches very closely, or is identical with, emmetropic balance. This would be impossible without positive relative convergence.

2. Asthenopia is frequent in low H. associated with high near exophoria: more so, I believe, than in equal degree of H. with usual near balance.

3. Asthenopia sometimes persists, after correction of refraction error, the high near exophoria also remaining. When positive relative convergence has been developed by exercise, both disappear.

4. The symptomatic treatment by abducting prisms has relieved, without refraction correction.

In table I. is given the sex, age, occupation, refraction error, distance and near muscular balance, with sundry other clinical items connected with twenty-one cases of hyperopic refraction, associated with abnormally high near exophoria. All of these patients used the eyes a great deal for near work in either their occupation or pleasure. I have omitted several cases somewhat complicated by anisometropia or amblyopia. When possible, a mydriatic was used: when impossible, for information concerning Hl. objective methods were employed. Studied from the standpoint of refraction, there is to be noted in the cases: (1) the low degree of H. In only one (21) was the meridian of highest error over 1.50. (2) low astigmatism was present in all but two of the cases (3, 13). Its correction in the majority, together with H, when it was manifest, relieved asthenopia. (3) Homatropine (gr. viii to ℥i or Wood's gelatin discs) was used in 12 of the 21. Before refraction examination, it was determined that cycloplegia had been obtained by testing the range of A. left, and ability to retain best distant vision with weak concaves (0.25 or 0.5 S.). After the return of ciliary power, ten out of the twelve accepted full correction. Of these, 9 and 17 had worn +1.S and +0.75S for near work for a year, and before mydriasis their total spherical error was manifest. Case twelve had worn full correction for two years. In 9 and 17 there was extra-ocular trouble,—chronic dyspepsia and pregnancy—to account for, in part at least, the eye or head pains. They are recorded to show (a) the apparent relation between H. and high near exophoria: (b) the co existence of good adduction and normal p.p. convergence with high near exophoria. Case twelve will be discussed later. In five others of these ten (5, 11, 13, 20, 21), there was no Hm. before the use of homatropine. In these the spherical error equalled or exceeded the astigmatic. The remaining two (8 and 14), who accepted the full homatropine correction, rejected convex glasses, and accepted concave cylinders before mydriasis. The astigmatic element was predominant. Without stopping to closely analyze these refractive conditions, one is justified, I think in concluding that the ciliary muscle was weak rather than abnormally strong. Low degree, latency, easy change to Hm. and asthenopia are the essential points to note.

The muscular conditions are best studied with reference to the balance at 20′: but, generally, it may be noted that in all of the cases adduction was either normal, or, if low, capable of rapid development by Gould's exercise. In two cases (12 and 15), two weeks of exercise were required to develop adduction to the point recorded. Then relief came. Case twelve had been wearing full astigmatic correction. High near exophoria and defective adduction were the only errors I could find. In case fifteen I should have corrected the entire spherical error. Adduction—*i.e.*, power to overcome prisms, bases out, for infinity—I do not regard as a test of intrinsic internus strength. It seems to me only positive relative convergence for distant vision. When defective, it can be rapidly developed. Its association with high near exophoria in hyperopia may be, as seen in cases twelve and fifteen, a source of trouble.

TABLE II.

ORTHOPHORIA AT 20′.

Acc. needed in Static Refraction, measured in meridian of greatest error.	Suppressed Internus Innervation, required by Refraction Error, measured in metre angles.	Near Exophoria found, measured in metre angles.
0.5D. manifest. 1.5D. total (Ret'oscopy)	1.5 m.a.	1.71 m.a.–Table I, case 3
1.5D. (0.75 Astig.)	1.5 m.a.	1. m.a. . . . . .case 5
1.25D. (0.75 Astig.)	1.25 m.a.	1. m.a . . . . .case 10
1D. (0.5 (0.25 Astig.)	1. m.a.	1. ma. . . . . .case 11
1.5D.	1.5 m.a.	1.14 m.a. 13
1.25D. (0.25 Astig.)	1.25 m.a.	2.43 m.a. 15
0.75.	0.75 m.a.	1.28 m.a. 17

Distance balance was orthophoric in seven cases. These I have put in table II, showing A. needed for d. v., amount of suppressed C. for d.v., and near exophoria measured in metre angles. Omitting case fifteen, near exophoria does not vary more than 0.5m.a. from internus innervation suppressed by refraction error. There seems to be, practically, the same relative ciliary and internus innervation at both ends of the line. The individual had not sufficient use of his positive relative convergence to bring his suppressed internus action within the line where hyperopes work comfortably.

In five, distance balance was esophoric with low abduction (cases 1, 2, 4, 6, 8, table I). These afford positive proof against the near exophoria meaning intrinsic weakness of the interni. Farther it is to be noted that near exophoria, in relation to the distance balance, is high in all of these cases, and very nearly equal, (16°, 10°, 14°, 14°, 10°). It is also worthy of note that case six only has enough refraction error to suppress internus innervation materially. As a hypothetical explanation of this high near exophoria, with d.v., esophoria, the law of compensation suggests itself. We correct hyperopic refraction in toto in esophoria to lessen, as much as possible internus innervation. May not our rule be, after all, only an imitation of nature in producing compensative deficient action of the interni?

In the remaining nine, distant balance was exophoric: ½° in one, 1° in four, 2° in four. That these cases were not true interni insufficiency, demanding treatment, seems clear from the low degree, the closeness of near exophoria (except in case 21) to that demanded by H., and low or normal abduction. To explain it one must consider together this closeness of the near exophoria and refraction suppression, the low astigmatic refraction, which was in some instances against the rule, that only three had any previous correction, and that, with possibly one exception (20), all worked the eyes hard. Again one often measures heterophoria at different sittings with greater diversity than 2°. I am in full accord with my friend, Prof. Chisolm, concerning the trouble low degrees of astigmatism give. Probably the accommodative effort made to correct them is responsible. I have repeatedly noticed variations, within narrow limits, of distance balance in just these cases. While nine cases of low distance exophoria are certainly striking, in the absence of all other symptoms, I do not think interni insufficiency a justifiable diagnosis.

To conclude: It seems to me that, (1.) the association of hyperopic refraction and high near exophoria, without decided evidence of interni insufficiency at 20′, means deficient positive relative convergence. (2.) This is usually associated with a weak ciliary muscle. (3.) To primarily attribute accompanying asthenopia to this near exophoria, and to treat it with abducting prisms is erroneous. (4.) It calls for correction of all or nearly all the hyperopia, which usually becomes manifest after mydriasis. (5.) If refraction correction does not relieve asthenopia and bring about the usual relation between distance and near balance, positive relative convergence should be developed by Gould's method of exercise.

816 Park Ave.

INSUFFICIENCY OF THE OBLIQUE MUSCLES, A NEW METHOD OF TESTING.

By G. C. SAVAGE, M.D., Nashville, Tenn

In commenting on insufficiency of the obliques, critics have differed as widely as it is possible. Some have claimed that they have not been able to discover the condition in a single case; while others, among whom is Dr. Eaton, of Portland, Ore., claim that the phenomena might be brought out in almost all cases. So common did this latter class find the condition, that they unhesitatingly pronounced it to be normal. Between these two extremes is to be found the truth. Not more than twenty-five per cent. of cases, the double prism being used, will show, even under the proof test, insufficiency of the superior obliques; while less than one per cent. will show insufficiency of the inferior obliques. Within the past few months a most remarkable case of insufficiency of the inferior obliques has been observed. So marked was the dipping of the middle line toward the corresponding side that it took a plus 6.00 cylinder, revolved through an arc of 45° from the vertical, to parallel the lines. As great as was this error, the patient had not suffered at any time much inconvenience in reading or writing, which of course was done below the horizontal plane. Anything like this quantity of insufficiency of the superior obliques would have rendered her wholly incapable of any comfortable seeing, even in the horizontal plane; most certainly would it have been so below the horizontal plane.

Soon after beginning the treatment of the obliques, and before Dr. Wilson had written his criticism of my method of treatment, I had observed that some patients did not improve, while others had marked improvement. Some patients even got worse under the treatment. On investigating these cases it was soon brought out that those who were not improving were exercising their eyes while looking at the blaze of a candle; while those that improved most rapidly exercised while looking at a broad lamp blaze. From that time on I directed that all patients should use the broad lamp blaze when exercising, and never the pointed blaze of a candle. It is certainly true that artificial oblique astigmatism will call into action either the superior or inferior obliques, depending on the character of the blaze looked at. The plus cylinder revolved in the lower temporal quadrant, intended for exercising the superior obliques, will unquestionably call into action the inferior obliques if there is more of the vertical area of the retina, than of the horizontal, impressed by the image of the light. This is exactly what would occur if the candle were used. For this reason the word "candle," wherever it appeared in this chapter in former editions, has been stricken out. Better still than a broad lamp blaze is a horizontal slit in an opaque metal chimney. The chimney should be rectangular, and should be made large enough to fit over an Argand burner, or even a large lamp chimney. The outside should be black, while the inside should be made bright. The slit should be made as long as possible, and perfectly horizontal. It might vary in width from an eighth to a quarter of an inch. Looking at this slit through the plus cylinders, revolved in the lower temporal quadrant, would call into action only the superior obliques; while the same cylinders, revolved in the lower nasal quadrant, the patient looking at the same horizontal streak of light, would call into action the inferior obliques.

Careful observation of any reasonable number of refraction cases will serve to convince any investigator of the fact that there is such a thing as insufficiency of the oblique muscles. A careful study of the cases in which this condition is found will show that at least a part of the nervous phenomena which they exhibit is dependent on the existence of this condition. Two evidences may be observed as to the good effect of the treatment of insufficiency of the obliques, as set forth in this chapter: the one, a parallel condition of the three lines, when under the double prism test, a revolution of the proof cylinders in either the one direction or the other from the vertical, through an arc of 5°, causing the middle line to dip either to the right or to the left. The other evidence is that the patient gets relief from the nervous symptoms which had depended on the existence of the muscle error. However many ocular errors may be found in any one case, the operator, guided by the proper indications, should feel it his duty to treat them all.

If what is taught in the first four chapters of my book, New Truths in Ophthalmology is false, then the teaching of this paper cannot be correct, so far as the treatment of the obliques is concerned; nevertheless it would remain a fact that there is such a condition as insufficiency of the obliques. But if the teaching of these four chapters is correct, then not only is the teaching of this paper correct as to the existence of insufficiency of the obliques, but it is also correct as to the treatment of this condition. If natural astigmatism calls into activity either the superior or inferior obliques, the meridians of greatest curvature diverging or converging, then the production of artificial astigmatism must be able to do the same thing. The making and unmaking of artificial oblique astigmatism will call into rhythmic contraction and relaxation either the superior or inferior obliques, as may be desired by the operator.

One of the easiest, quickest and surest tests for insufficiency of the oblique muscles is by means of the Wilson phorometer. The rotary prisms should be placed for testing sursum- and deorsum-duction. The rotating of the prisms should be continued beyond the strength of the muscle to prevent diplopia. If the sursum-duction is 3°, the rotation should be carried to

4° or even 5°. The false line will appear above the true one, but will be parallel with it if the inferior oblique is sufficiently strong to counteract the torsion effect of the acting superior rectus. By reversing the action of the prisms, the two lines will be simultaneously fused throughout their entire length. Should the inferior oblique be weak, the false line being seen by the left eye, the two lines will converge at the left; and the left ends of the two lines will fuse first when the rotation of the prisms is reversed.

If the displacement is such as to call into action the inferior rectus, when carried far enough to cause diplopia, the false line (the lower) will be parallel with the other, if the superior oblique is strong enough to counteract the torsion effect of the acting inferior rectus; but if the oblique is not strong enough to accomplish this result, the two lines will converge at the left. Reversing the action of the prisms, the left ends of these lines will fuse first. In my own case the lines are parallel when the false one is above, but converge at the left distinctly when the false line is made to appear below. Reversing the action of the prisms, when the false line is above, the two fuse throughout at the same moment; but when the false line is below, fusion of the left end takes place first. Just the reverse is true in Dr. G. H. Price's case. I have known for three years that I have slight insufficiency of the superior obliques, and that Dr. Price has insufficiency of the inferior obliques.

The test can be made in both the far and the near. If the distant test should show no leaning of the false line, but the near test should reveal it, at once suspicion of error of attachment of the interni would occur. Such an error of attachment of the interni would not only converge the visual axes but would also effect torsion in one direction or the other, which would manifest itself or not, depending on the quantity of the corrective power of the obliques.

Dr. Maddox, of Edinburgh, was first to call attention to the delicacy of the test of the obliques by means of revolving a single prism, which had caused vertical diplopia, in such a way as to fuse the two lines. Insufficiency of the obliques will allow fusion at one end first. When the base of the prism was down, its revolution tested the inferior oblique; when the base was up, its revolution tested the superior oblique, a statement not made by Dr. Maddox.

The delicacy of the test of the obliques by the Wilson phorometer will show, no doubt, a larger per cent. of cases of insufficiency of both the superior and inferior obliques than could be found by the double prism test.

All the cases thus found need not be treated. If in both the sursum and deorsum tests, the superior obliques should show weakness by the false line, when above, leaning to the opposite side, but not to so great an extent as when below, certainly these muscles should be strenghtened by exercise. On the other hand, when the false line is below and inclines towards the corresponding side, though not so much as when above, the indication for treating the inferior obliques is strong.

I have not seen such a case, but I believe it possible for the false line to incline in one direction when above, and in the opposite direction when below the true line, thus clearly showing insufficiency of both the superior and inferior obliques. This might be so great as to require the exercise of each pair (the two superior being counted a pair and likewise the two inferior) at least once in the twenty-four hours. Such a condition of the obliques would be like asthenic orthophoria.

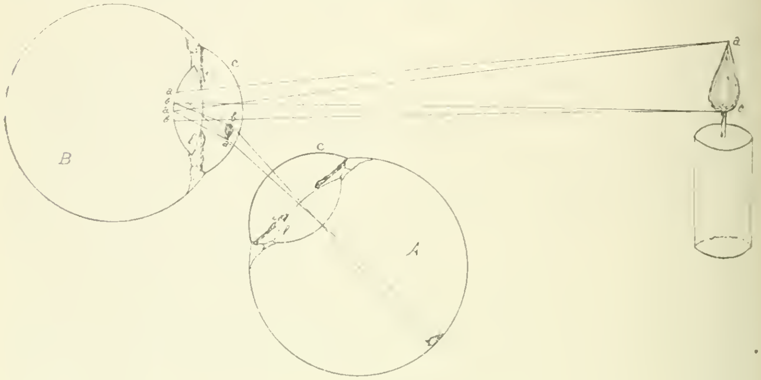
A NEW METHOD OF EXAMINING THE CORNEA.

By JAMES W. DUNN, M.D., Nashville, Tenn.

As is well known, the posterior surface of the crystalline lens is a concave mirror whose principal focus is within the cornea. This being true, the inverted image of every object in front of the latter structure, so situated that its rays of light may pass through the pupil and strike this surface and be reflected back again, must be formed somewhere in the anterior chamber. We do not, however, see this image, except under favorable conditions, owing to its smallness, our distance from it and the great flood of obscuring light that ordinarily enters the eye. We can easily not only verify this fact, but utilize it in examining the cornea for foreign bodies, opacities, etc. To do this we proceed as follows:

Have the patient face a bright light at which he may be told to look. To examine his right eye, we take our position almost in his front, but a little to his right and facing him. Keeping our nose pointed towards the patient's right ear, we approach him taking care not to cut off the light with our right cheek. When within an inch or less of the patient's cornea, we may, by moving up and down and from side to side, get an inverted image in the anterior chamber of the lashes of the upper and lower lids and any small object that we may hold close to, and in front of the eye. At the same time, we may examine the cornea by transmitted rays from the inverted image of our light. By moving about as above, we may get a view of the entire corneal surface. The accompanying diagram illustrates how the reflection occurs both for objects and for a light. We cannot, however, see the image of the light for the reasons given above.

A is the observing eye, B the one being observed, and *c*, *i* and *l* the cornea, iris and crystalline lens respectively of each eye. Let *ab* represent a light. Rays from the point *a* are reflected from the points *a′ a′* on the posterior surface of the lens to the point *a″*; rays from the point *b′* are similarly reflected and come to a focus at *b″*. We thus have an image of *ab* formed at *a″ b.″* The rays from this image in their passage into the observing eye so light up the cornea that it can be examined very satisfactorily. All the objects seen are very much magnified because of their proximity to the observing eye.



That the image is formed by reflection from the posterior surface of the lens is proved by the position it occupies, the fact that it is real and inverted, and that it moves in a contrary direction to the movements of the object forming it. By proceeding cautiously, we may convince ourselves also that an image of the cornea being examined is similarly formed, but it is too indistinct for practical purposes. This indistinctness is due to the almost perfect transparency of that structure and its nearness to the center of curvature of the reflecting mirror.

SEVERAL CASES FROM PRACTICE.

By G. H. PRICE, M. D., Nashville, Tenn

DETACHED CHOROID.

A few days since, Mr. C. came complaining of dimness of vision and limitation in the upper field of vision of left eye. Upon examination it was found that the vision in this, the left eye, was only about $\frac{20}{50}$ while that of right was normal. He had noted that his vision had been growing dim for some days (about ten days), and that, as he expressed it, he could not see the upper parts of objects, while the lower parts would appear about as usual, except as to distinctness, which was below the normal.

There was no redness, swelling or tenderness of the parts, the pupil about as that of right eye, responding to the influence of light; no dread of light. The use of a drop of homatropine soon had the pupil dilated sufficiently to permit careful examination of fundus with the ophthalmoscope, when the following condition was revealed:

The fundus in the upper half could be easily seen through the aperture, both to nasal and temporal sides, and the disc was easily seen; below the disc, and extending to the nasal and temporal sides, the retina was elevated above the level of the general fundus, as was shown by the fact that it required plus lenses—from 2.D. to 6 or 7.D.—to bring the parts into view as we proceeded to the peripheral portion. There was no decoloration of the retina, as in detachment and yet the retina was elevated above the level of fundus. Inspection developed the fact that there was a line of demarkation between the retina in normal position and that abormal, which appeared white and marked in a crescentic line the limitation of this changed condition. This caused a closer investigation as to the probable cause of this condition.

Upon being asked if he had received any injury which might cause such trouble, he then said that some two weeks before, while in a game of basketball, one of the men stuck his finger in his eye, causing him temporary trouble, but this incident had not been connected with the present condition. He had not noted any change in vision nor encroachment on the field until a week or more after this accident, but now calls to mind the fact that they have gone on pari passu since first observed. This then seems to be the causa proxima of this condition and probably caused some slight injury to the ciliary body or choroid which has thrown out an effusion under the choroid, thus lifting up both choroid and retina; hence we see no decoloration in the elevated retina. At this time this condition seems to be subsiding under alterative treatment, though the vision is as yet not much changed.

EPITHELIOMA.

Case No. 2. Mr. C., came to consult concerning the condition of his eyes, the cause of trouble being in or on the lid of right eye. Here was a growth, which had made its appearance some years since, but which gave him no special trouble for some time, but for the last few months it had been annoying him, both on account of the deformity and irritation now present. Investigation revealed the fact that the growth involved the upper lid from the outer canthus to a point a little beyond the middle of the lid; it was nodular and much thickened and at this time more or less irritated. From the outer canthus it extended well down upon the lower lid and reached almost to the inner canthus, the extension downward involving the tissues beyond the rim of the orbit. The conjunctival surfaces were also involved in this growth, and it was encroaching upon the ocular membrane. The vision of the eye was not materially affected, but the eye was irritable.

He was advised to submit to a radical operation as the only possible permanent relief, and was informed that the operation would include the removal of the eye in order to get rid of all the offending and threatening growth. He had been seen before and advised to submit to an operation, when only a small part of the lid was involved, but had refused, hoping the growth would disappear, but now he consented, and his case was brought before the class at the clinic of Dr. Savage in the Vanderbilt Medical Department.

Under the influence of ether, he was operated on about the middle of December, the operation consisting in the removal of about three-fourths of the upper lid, all of the lower lid and part of the tissue lying well down upon the cheek; in addition to this the eye was enucleated and all suspicious tissue in the orbital cavity was thoroughly removed. The after treatment consisted of a thorough application of iodoform, applied at each time the cavity was dressed, which was done each day until the exposed surface had been materially lessened by the production of healthy tissue.

The process of repair was rapid and satisfactory from the first and the patient was discharged and ordered to report from time to time for inspection. He has been seen several times and his condition is most favorable.

I would stress the use of the iodoform in these cases, since the results in our hands have been so favorable.

Case No. 3. Mr. A., aged sixty years, or more, from a distant state came for advise. His condition was about as follows: the lids of his right eye, were involved in a condition which had been diagnosed as epithelioma and which there was every reason to confirm. The disease was not confined to the external surfaces alone, but had progressed until the entire structure had been invaded and an extension to the deeper parts of the orbit and tissues surrounding, the entension being mainly into the tissues underneath the lower lid. He had been treated by the application of caustic pastes with the hope of checking the disease but this had failed, after having been subjected to this treatment several times.

In addition to the manifestations of disease in the appendages, the eye itself had also suffered from the invasion of the disease, until at this time it was a shapeless mass.

There was one course only to persue, and the patient was informed that it would be necessary to remove all the diseased tissue, the eye and such other structures as might be found involved. The operation consisted in removal of the upper lid, the lower lid, the operation extending well down on the cheek, the enucleation of the eye, the removal of the contents of the orbit.

Upon the removal of the contents of the orbit, it was found that in the anterior portion the bone floor was diseased to such an extent that there was an opening extending into the antrum of Highmore.

The gouge was used for removing all diseased bone, the removal extending well beyond the limits of disease.

There was considerable hemorrhage which abstructed the operation, but which yielded to pressure. The cavity, having been freed as far as possible of the diseased tissue, was dusted well with iodoform and packed with surgeon's lint, the packing being held in position by a compress of iodoform gauze.

This dressing was changed daily for a few days, always washing parts with bichloride of mercury solution, dusting well with iodoform, and packing as before.

The patient made a good recovery and was on his way home in a few weeks.

It has been eight years since this case was operated on, and there has been no return as yet.

The simple after-treatment of this case, consisting of the use of iodoform dusted well upon the parts, and our experience in a number of similar cases with like results, has led us to conclude that there is much virtue in this drug, and we accordingly use it with much confidence in these cases.

SQUINT.

Case No. 4. Miss M. O., aet. fourteen years, was brought to the city for consultation concerning the condition of her eyes. She was wearing lenses, which had been given her about a year ago, but from which she had derived no benefit, but rather to the contrary. She was suffering from dimness of vision, internal squint, and more or less dread of light. The lenses proved to be spheres—1.50 D. each.

Preliminary examination showed, amblyopia of O.S., well marked, slight of O.D., and esotropia, which, as soon as the minus spheres were placed in front of her eyes became a well marked internal squint pronounced in O.S. Investigation further demonstrated that she was hypermetropic, and should have lenses to correct this defect. The lenses she had been using were given her without first having suspended her accommodation, and were accordingly worthless, and even worse.

It was further developed, that her condition previous to use of lenses, was one of periodic, then alternating strabismus, which became permanent, specially marked in O.S., after beginning the use of the minus lenses.

Notwithstanding these facts, she was advised and urged to use the glasses, according to her own reports. This emphasizes the caution, which has been often given by those of experience, against the prescribing of lenses for children without the suspension of the accommodation.

Under homatropine she developed the following:

$$\text{O. D. V.} = \tfrac{20}{30} \text{ w} + 1.25.$$

$$\text{O. S. V.} = \tfrac{20}{100} \text{ w} + 2.50.$$

These lenses were prescribed, and until they could be had from the manufacturers, she was instructed to give her eyes rest.

After having worn the lenses about a month, she came again to the city to report in person as to her condition, when the following was found to be the case:

Eyes straight, photophobia gone, suffering having entirely disappeared, entire expression and manner of patient changed from one of discomfort to one of comfort, able to continue her school work with ease.

The patient was now questioned as to her experience in use of correction given. When she informed us that her relief was from the first, and there was no disposition on part of O. S. to squint while wearing glasses given.

We had investigated the condition of the vertical muscles when the examination was made and there was balance, which now remained. The patient was instructed to look through the upper and then lower portions of the lenses to see if the prismatic effect would cause any change in the lateral balance. This was repeated several times but no change was noted, while if the lenses were removed the squint appeared.

From this case it is apparent that the chief cause of the squint was the hypermetropia, which had been aggravated by the wearing of the minus lenses.

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The Complete Program

For the Atlanta meeting of the Section of Ophthalmology, A. M. A., we hope to publish in the next issue of the RECORD. You may expect to find it good.

Nyctalopia.

In our comment on Mr. Tweedy's paper on the above subject, we stated that the recent authors we had looked into still used the term in the sense of day-blindness. De Schweinitz, Juler, Nettleship and Swanzy all use it in the proper sense; but Juler advises that since confusion exists, the word ought not be used longer.

The Presbyterian Eye and Ear Hospital,

Of Baltimore, has followed the Wills Eye Hospital, of Philadelphia, in sending out reports at shorter intervals than formerly. This is likely to prove a success, and if so, its continuance will add one more special periodical to the already long, and still growing list, of special journals. The copy before us is very interesting, as a report from such a source must necessarily be.

A Little Late.

This issue of the RECORD has leaped over into the month following its date. This is the first time it ever occurred thus

We will try to see to it that it does not occur again, at least until the next "leap year," which is eight years hence.

It is a compliment to the Record for enquiries tc come in, as they do, whenever it fails to come out on its usual time.

The Functional Examination of the Eye

Is the title of a little volume from the pen of Dr. John Herbert Claiborne, Jr., of New York. There are ninety-six pages and twenty-one illustrations. The author claims to have advanced no new ideas, but that he has only clothed "the known facts of a dry subject" in a new and pleasing dress.

The book is a compilation of nine lectures delivered to the classes of the New York Polyclinic, and of the College of Physicians and Surgeons. Beginning with the study of vision, he next shows how to make examination for determining its acuteness. He then discribes prisms, lenses and the trial case, after which he takes up the study of the refraction of the eye. The several errors of refraction are described and his methods of correcting them are set forth. Astigmatism is discussed in one chapter, and following this another chapter is devoted to the recital of cases of astigmatism. The eighth chapter is a study of presbyopia: while chapter nine speaks of mydriatics.

The chapter on vision is by no means exhaustive, and the nodal point is so placed as to limit the temporal field of vision to 60° or 65°. The study of refraction and the errors of spherical refraction might have been given much fuller consideration; and his ignoring the state of the muscle balance as a complicating factor, one that must always influence the character of the correction to be given, is an unfortunate omission. The skiascope and the ophthalmometer, two almost indispensable instruments in the study of astigmatism are not mentioned, except in the introduction. Metamorphopsia, a most annoying symptom experienced by many patients for a longer or shorter time after beginning the use of correcting cylinders, has no place.

Some ot the short-comings above mentioned may be excused on the ground that the author, in his introduction, indicates that he intended considering only the methods of subjective examination. It is to be regretted that he did not undertake to present the subjects treated more fully. As "first lesson" for the beginner in ophthalmology the book will serve well. The general practitioner may obtain from its pages, in a short space of time, information that will be helpful to him.

The book may be gotten from the Edwards and Docker Co., Philadelphia, Pa., through any book dealer, the price being $1.00.

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ALBUMINURIC RETINITIS IN PREGNANCY.*

By H. V. WÜRDEMANN, M. D., of Milwaukee

Director Wisconsin General Hospital and Secretary of the Association; Oculist and Aurist to the Children's Hospital and to the Milwaukee County Hospital for the Chronic Insane: Secretary of Section on Ophthalmology American Medical Association for 1895.

Affections of the eye in all forms of Bright's disease are more common than is generally supposed. They occur in 20% to 33% of all cases of albuminuria[3]. Retinal complication in pregnant women subject to nephritis is likewise not uncommon although seldom diagnosed. The relative infrequency of these cases in ophthalmic practice is readily explained by the fact that such cases come to ophthalmoscopic examination only after the sight is materially affected. We may have marked changes in the fundus with preservation of fair vision, and in the puerperal state the woman is frequently indifferent to the eye symptoms unless they are quite pronounced. However the involvement of the visual organs is a grave symptom and hence it is considered that the eyes of all pregnant women subject to nephritis should be examined by the ophthalmoscope.

Although the occurrence of albuminuric retinitis during the latter half of pregnancy is not of such fatal significance as that coming from other causes (where 50% die within the year after its discovery and few live beyond two years[1][11]) when such a condition comes on in the earlier stage it is of serious import. On account of the resultant loss of sight as well as the danger to life from the renal disease and its complications, the question of premature delivery may be properly raised[8]. A number of cases are on record where this was done with salvation to both the eyesight and life[4 6 7 8 10]. The induction of labor is allowable when the retinitis appears in the early stage of pregnancy and persists in spite of treatment but is not warrantable during the last few weeks unless the inflammation be unusually severe[4].

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*Being a Portion of a Symposium on Albuminuria of Pregnancy, read before the Milwaukee Medical Society, February 26th, 1895

Some cases show a marked improvement in visual acuity but few make complete recovery and a certain proportion do not live long enough for the eye symptoms to disappear. I will shortly relate an interesting case coming under my own observation where the patient died despite the fact that the albuminuria appeared late in pregnancy and that marked improvement followed delivery both as regards the renal disease and its complications.

The characteristic retinal and nerve lesions are distinguished especially by whitish patches and hemorrhages, together with other features showing vascular disturbance and the retinal and nerve swelling common to other retinites. Pathologically, there is no difference between the ocular complications of renal disease whether occurring in pregnancy or not. Weeks[12] claims that in puerperal cases the kindney disease precedes the ocular lesion and that edema and the white plaques appear first, followed later by hemorrhages. When the kidney disease is but a part of, or a sequel to, general systemic degeneration of the arteries, capillaries and veins, the eye symptoms may precede those of the kindneys and here hemorrhages in the fundus appear first, the white patches coming on later.

It should be remembered that the characteristic spots in the fundus are degenerative changes and are not albuminuric deposits. The peculiar star-like appearance at the macula is due to fatty degeneration of the fibers of Mueller. The large white blotches occuring on the nerve and in different parts of the fundus are either the remains of blood clots or are caused by fatty infiltration in the granular layers. In a recent case that I had under observation the patches were so many and so prominent that the fundus presented the likeness of a mackerel sky as noted by Noyes.[8]

All grades of degeneration and inflammation may be present, from the star-shaped appearances at the macula to a high grade of neuro-retinitis. The disease is generally binocular. Pathologically we have the products and consequences of inflammation and hemorrhage with peculiar degeneration of nerve fibers, fatty infiltration of the granule layers, connective tissue changes in the rods and cones, pigment deposits, hyperplasia of connective tissue and its fatty degeneration[8]. Usually the vision deteriorates, especially if the nerve be implicated, as atrophy then sets in. Sometimes retinal detachments occur which have been known to disappear[2 12] producing permanent blindness in part of the visual field, or transient uremic toxemia causes complete blindness for a day or two. I have never seen this in puerperal cases and such complications are rare even in albuminuric retinitis from other causes.

The greater amount of retinal change, especially if accompanied by numerous hemorrhages and neuritis, the more lethal is the significance, as the same changes take place in the brain. Although this degeneration occurs most frequently in the retina we may likewise have it in other parts of the eye as in the choroid, the ciliary body, the iris, and the conjunctiva. Retinitis, however, is the most frequent eye complication. From the degenerative changes at the base of the brain we may have paralysis of the ocular muscles. Such however is rare.[5]

The following case of albuminuria occurring in pregnancy accompanied by eye complications and terminating a year and a half later in death by Bright's disease, is of considerable interest.

Mrs. A. M., aet. twenty-six, primipara, patient of Dr. L. G. Nolte, had albuminuria all through pregnancy; the nephritis being most severe in the fifth month; disease commenced first with vomiting and progressed with uremic attacks as a complication; child born alive but died within a few days. Dr. Nolte called me in consultation about a week afterwards on account of her vision, which had failed rapidly since the delivery, although for a couple of months previous she had been unable to read. Shortly before the event several uremic attacks had set in, and when I saw the patient she had the typical appearance of a Bright's patient with uremic toxemia. At this time albumin and many hyalin casts were present in large quantity in the urine. Vision was reduced in the right eye so that she was only able to distinguish the hand before the face and in the left, fingers could be counted at one meter. Ophthalmoscopic examination revealed typical neuro-retinitis albuminurica; the white plaques being present in such great quantity that they resembled cumulous clouds. The patient recovered incompletely and slowly, albumin disappearing from urine about three months after the child-birth. I made many ophthalmoscopic examinations of the case for a year and a half, seeing the appearance of the fundus gradually improving until one year later the vision of the left eye was nearly normal, while the right only improved to the counting of fingers at three meters. During this year she was evidently in fair health. The first of February, I fitted her with glasses for a moderate amount of hyperopic astigmatism with which the vision of the left eye became normal and the right was slightly improved. At this time she had characteristic uremic odor and complained of headache; albumin and casts were again found in large quantity. Her health had been failing for about a month. She gradually declined and died, during the latter part of the summer, of Bright's disease. Although this case history is not complete it may be of value as it shows that too favorable a prognosis should not be given in the case of pregnant women with albuminuria.

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THE USE OF FORMALINE IN OPHTHALMIC PRACTICE.

By SWAN M. BURNETT, M.D., Ph.D., Washington, D. C.

Formaline is a 40% watery solution of formaldehyde. Formal the German preparation is of approximately the same strength.

Formaldehyde itself is a strong escharotic and one of the most powerful germicides and antiseptics known. Animal tissues suspended in its fumes are preserved from putrefaction. As a tissue preserver formaline has no superior, and will no doubt supplant alcohol for that purpose, since it is much cheaper, and has many other advantages as a preserving agent. In the first place it does not act by extracting the watery constituents from the tissues, and there is therefore, no shrinkage and consequently no distortion of the elements from their normal relations. The tissues also retain much of their original color and transparency. Even the crystalline lens does not become completely opake under its influence for quite a long while. In the preparation of tissues for section for microscopic examination, therefore, it is vastly superior to alcohol or Müller's fluid or any other agent that has been yet employed for that purpose, and it has the further advantage of being very rapid in its action. An eye will become sufficiently hard for cutting in three or four days in a 5% or 10% solution which is the strength usually employed as a hardening agent.

The ophthalmological world first became aware generally of the value of this quality of formaline through Prof. Leber of Heidelberg, at the Ophthalmological Congress in Edinburgh in 1894. The credit of its first use, however, I believe belongs to Hermann.

These qualities of the chemical are already recognized by many but are not, I think, as widely known as its merits demand, and for this reason I here call attention to them again.

My special purpose in this short paper is to set forth its therapeutic value in ophthalmic medicine and surgery. A germicide of its great power—first noticed by Löwe in 1888,—is an important addition to our list of remedial agents, not only because of its efficiency, but likewise because of certain other advantages which it possesses over any other known antiseptic of equal power. It has little if any toxic properties. Up to this time no case has been reported of any deleterious effect from its use.

It has one other property peculiar to it or certainly not possessed by any other drug to the same degree, and that is power of rapidly diffusing itself through the tissues. This applies not only to the dead tissues but to the living as well. One great drawback to the efficiency of sublimate as we know, in addition to its toxic effect, is its power of coagulating the albumen at or near the surface, which not only forms a barrier to its further penetration of the tissues, but even constitutes a good nidus for the development of pathogenic germs. For this reason, therefore, formaline should be more useful than any germicide we have for that class of infections in which the microbes penetrate below the surface and into the substance of the tissues.

Most excellent results have been obtained from its use in infecting ulcers of the cornea and purulent conjunctivitis. My own experience with the remedy in both forms of disease has been very encouraging. The corneal ulcer can be touched with solution of 1 to 200 or 1 to 500 once every day, and for general use as an antiseptic a collyrium of 1 to 1,000 or 1 to 2,000. I have a few times cauterized the ulcer with 1 to 100. One case of serpiginous ulcer I treated with formaline alone, and it turned out more satisfactorily than I have seen such cases by the old methods. In muco-purulent and purulent conjunctivitis my experience with it has been most satisfactory. I have not yet relied upon it alone in the severe forms of purulent conjunctivitis, but in the milder forms I have, and have had no reason to regret it. But even in the severe cases I use it as a general antiseptic in addition to the silver nitrate. In acute catarrh of the conjunctiva (pink eye) it has acted most promptly when used as a collyrium of the strength of 1 to 1,000 or 1 to 2,000 applied every four hours. I have also tried it in those cases of chronic conjunctival congestion with diminished secretion which are often so rebellious to treatment, and in most instances with good results.

For ulceration of the edges of the lids, so far as I have had any opportunities of using it, the remedy has seemed to act well. The dosage in such cases is to be regulated by the desired effect, from 1 to 100 as a mild caustic, to 1 to 2,000 as a stimulant. I can commend it to the surgeon and dermatologist as most valuable in ulcers of the skin of all kinds and especially for those indolent ulcers with hard edges resembling epithelioma. The effect of the remedy on one such ulcer of the lower lid was very decided and prompt.

For the disinfection of instruments and keeping them aseptic, it has the great advantage of not dulling the edges of knives. It can also be used for washing out the conjunctiva previous to operation on the eye, though its disadvantage for this purpose is the slight burning sensation it causes sometimes even in solution of 1 to 1,000. This, however, is trivial.

So far as my knowledge of the literature of the subject goes it has been used therapeutically in eye affections by only a few. Guaita, of Siena, and two surgeons in England have made the only publications I have seen, and they have been brief.

AN OCULAR TEST TUBE.

By B. M. HANNA, M.D., Pittsburgh, Pa.

The apparatus, an explanation of which I propose to attempt in this communication, has been devised with the two-fold object of obviating an inconvenience and removing difficulties which have hitherto been quite troublesome. The inconvenience was that arising from the necessity for transforming my office into a dark-room whenever I wished to test ocular muscular abnormalities. The difficulties which I sought to overcome were caused by the annoying uncertainty of light obtained from a candle or gas jet. While proving extremely satisfactory in the attainment of these objects, the apparatus which I have devised has also enabled me to obtain more accurate results than were possible under former methods.

It consists of a galvanized iron tube, the entire interior of which is lined with black cloth. The one which I have had constructed for my own use, and which is in service in my office, is nineteen feet and seven inches long, five inches deep, and twenty inches wide at one end, and five inches square at the other end. The smaller end is entirely open, and is the one through which the patient looks when a test is being made. This end, resting upon a bracket, is so arranged that it can readily be brought into proper position or pushed aside as circumstances require. The larger end is mounted upon a pivot, and is closed with a cap in the exact center of which is a circular opening one inch in diameter. Back of this cap are two slides which work in grooves, and which are placed one in front of the other. These slides are perforated with holes—those in the first slide varying in size from one sixty-fourth of an inch to one inch in diameter, while those in the second slide are all

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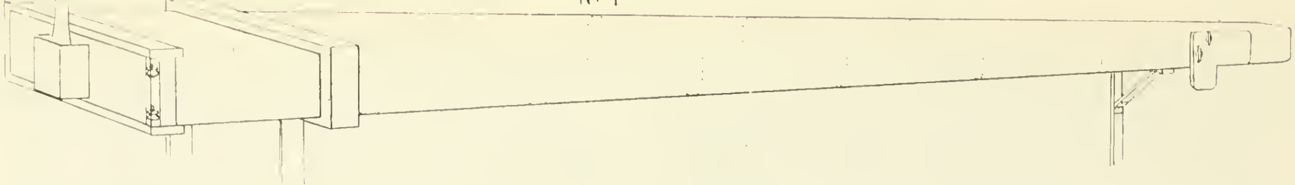

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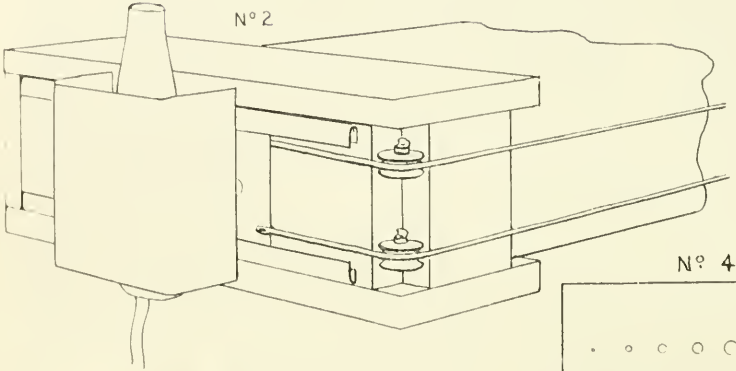

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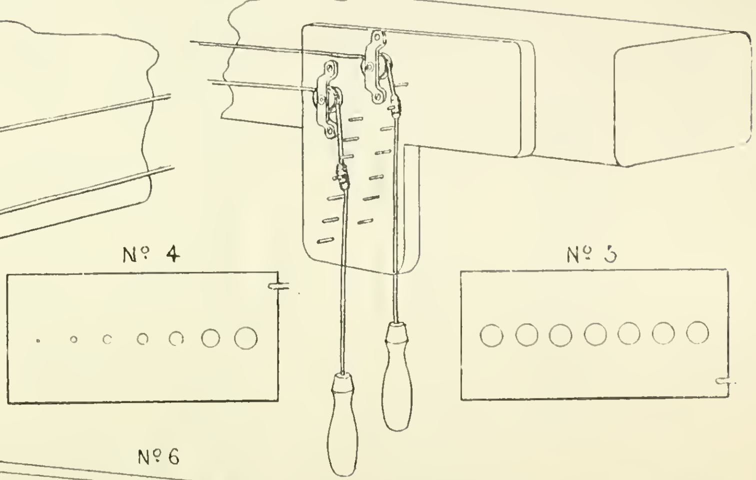

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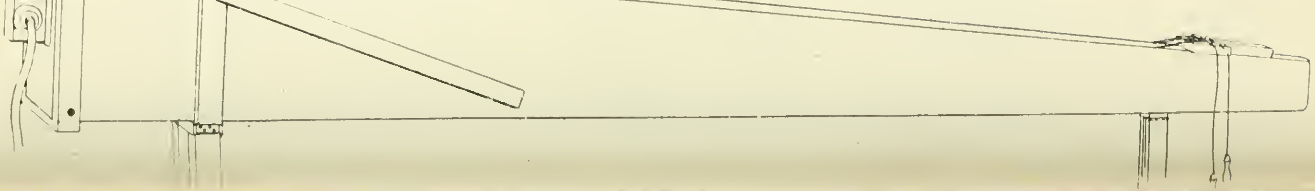

one-half inch in diameter. The slides are so adjusted that any hole in either, or one in each at the same time, can be made to center exactly with the opening in the cap of the tube. To one end of each slide is fastened a weight which draws it aside when released; and to the other end is attached a wire, fitted with a small piece of perforated iron. This wire runs over grooved pulleys on the outside of the tube, to a stationary tablet which is at the hand of the operator at the small end of the tube. Firmly fastened into this tablet are small pins which are inserted at will in the perforated iron on the wire, and the slide is thus held in any desired position—the whole arrangement being so adjusted that the fastening of the iron upon any one of the pins brings one of the holes in the slide to an accurate center with the circular opening in the tube cap. Just back of these slides is a tin box with openings cut in the top, bottom and side. This box contains a light (for which purpose I find an argand gas-burner the most desirable), and is placed with its side opening next to the slides.

The principle of the apparatus can, I trust, be readily comprehended from this description. The patient, looking through the tube from the smaller end, which is entirely open, sees the light shining through the circular opening at the other end. The size of this light is regulated by the operator, who brings into position any one of the smaller openings in the slide which he may desire. Only one difficulty was encountered in this arrangement, and it was caused by the occasional reflection of light rays upon the interior of the tube. This was easily remedied by the introduction of diaphragms.

I have been using this device in connection with a fixed appliance, a Risley chair, adjusted to the proper height for the patient, in which I have placed a pair of rotary prisms, for the purposes of (1st) determining whether insufficiency of ocular balance be present, and if so, then how much; (2d) measuring the relative strength of the external ocular muscles; and (3d) correcting astigmatism.

In determining the insufficiency of muscular balance and the relative strength of muscles, I find it quite an advantage to be able to vary the size of the light which is used. This I can do by pulling the first slide into such position as will admit the light through the opening of the size desired. In the test for particularly determining the relative strength of the muscles, the patient can much more readily determine the exact moment of the separation of lights when the hole is small, than when it is large—the appearance of separation occurring much more rapidly. In testing for insufficiency, by producing diplopia through the use of prisms, the amount can be quickly determined with great accuracy. In cases of astigmatism, the effect of a malformation of the circular light is discovered; whereas, when there is no astigmatism the light will appear perfectly round.

In the use of this apparatus, I place my patient on a chair to which I have attached, on the appliance already mentioned, a pair of rotary prisms properly centered for the individual patient. This done, I first cause the rotation of the prisms in such a manner as will produce vertical diplopia. This I follow with such a rotation as will cause horizontal diplopia. Having rotary prisms on both sides I am able to produce vertical diplopia with one pair of prisms, and so make my measurements with the other; and then I can produce horizontal diplopia with the other pair, and measure with the first. In this way I am able to test for heterophoria, and determine the amount of it, if it is found to exist.

In obtaining the relative strength of the external ocular muscles, I first correct any discovered hyperphoria by means of prisms, and then slowly rotate the horizontal prisms in such a direction as to cause the opposition of the external recti until the maximum power is exerted and diplopia is produced. Next, I do the same with the internal recti. Then, without correcting the horizontal deficiency, I test the relative strength of the superior and inferior recti, carefully noting the strength of the prisms necessary to cause diplopia in each case. It is now a simple matter to determine, by the ratio which the strength of one muscle bears to that of the other, the cause of the trouble. All this is done either under a midriatic or with full correction, taking care that it is properly centered.

The second slide which, as is understood, is merely a duplicate of the first except that the holes are of uniform size, was intended for use in determining whether any better (or even different) results could be obtained through the use of different colored lights. To this end, the one-half inch holes are filled with glass of different colors. It was also intended to serve in the working out of an arbitrary standard for railroad examinations. As yet, however, I have not had time or opportunity to so systematize and define experiments and results as to present those results. It has also occurred to me that, by passing transparent letters between the light-box and the tube, a more accurate knowledge of the visual acuity might be obtained than is possible by the present daylight method with its varying degrees of intensity. But for the present I justify my presentation of this apparatus principally on account of its convenience and the facility with which it overcomes such difficulties as I have stated as occurring under former methods of making these tests. I have been using it in my office for several months, and the gratifying success which has attended its use in my own practice has moved me to bring it, in this manner, to wider attention.

A CASE OF IRREGULAR SPASMODIC STRABISMUS ACCOMPANIED BY TEMPORARY SPASM OF ACCOMMODATION, DEPENDENT UPON ESOPHORIA.*

By CHARLES HERMON THOMAS, M. D., Philadelphia.

The case which I am to report to-night shows, in some of its details, marked individual characteristics; its symptoms, however, considered collectively may be taken as representative of a considerable group of cases of eye-strain having a muscular origin.

The patient, a young married lady, was referred to me by Dr. Elizabeth Sargent of San Francisco, at the suggestion of Dr. Edward Jackson. Refraction, compound hyperopic astigmatism — 1.75 ⌣ — .62 cyl. axis with the rule: has for some years worn weak prisms base in, in combination with sphero-cylinders; V.=R. and L. $\frac{20}{20}$—.

Pain and distress in the eyes accompanied by headache have been persistent and severe from childhood; has worn glasses with a number of changes since she was eight years old. At the time of beginning puberty, aged thirteen, she was attacked with severe coughing and strangling fits, accompanied by weeping and violent convulsive movements, which attacks have recurred at somewhat frequent intervals during the intervening period, until six months ago, when her general health having materially improved, and there was a cessation of the hysterical attacks. The asthenopic pain and headache have been for years of a most disabling character, interfering materially with, indeed almost forbidding, any use of the eyes in reading or other near work; is frequently wakened at night by the severity of the pain in the eyeballs. She is, beside, subject to attacks of great distress referred to the eyes, not, however, of a painful nature, which attacks are characterized by irregular spasmodic contractions of the interni accompanied by rapidly variable strabismus and much confusion of vision, together with general nervous perturbation.

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*Read before the Section on Ophthalmology of the College of Physicians of Philadelphia, February 18th, 1896.

Under ordinary circumstances and during the greater part of the time, the visual lines are apparently parallel, but marked convergent strabismus supervenes on taking off her glasses, or indeed, under almost any change in the usual condition of the eyes. On applying the cover test, the convergence becomes extreme; on shifting the cover she fails to see the target until she winks three or four times, and this is the case even though the uncovered eye is found to be looking in the proper direction. During the time the eye fails to see the target, the pupil is found in marked contraction; the instant the pupil expands to the same size as the other, the patient gives the signal that she now sees. Evidently the excessive convergence is associated with spasm of accommodation and accompanying pupillary contraction—the spasm of convergence being relaxed somewhat before the spasm of accommodation. Rotation is apparently normal, except outward, where it is limited in both eyes; the corneal edge cannot be made to touch the external canthus.

Wide homonymous diplopia is shown under a single dark purple glass, and is neutralized by 8° prisms base out. The phorometer shows esophoria variable 4° to 8°; abduction 4° to 6°; no hyperphoria manifest.

The patient being kept under daily observation for somewhat more than a week, it was found that movements of recovery were absent under prisms aggregating 8° base out. With these prisms, she also sees the target at once and without previous winking; they were, therefore, prescribed for temporary use and worn in addition to the refractive correction, resulting in greatly increased comfort. These prisms having been worn a week with continued comfort and the heterophoric conditions remaining stable, I determined to operate. Dr. Jackson arrived from Denver at this time, and, at my request, reviewed the case, and afterward kindly assisted me in the operation. A graduated tenotomy of the right internus was made with a result of esophoria 4°; abduction 10° and lessened movement of recovery under cover test. A week later, a like operation was done upon the left internus, resulting in esophoria 0; abduction 10° abolition of all strabismus, of all movement under cover test and of diplópia under purple glass test. Still a week later, the patient reports herself entirely comfortable and able to use her eyes freely and as never before in her life.

The operations were performed on the 10th and 20th of November, 1895 respectively. Recently, in January, I received a letter from her husband, saying, "I am very glad to report that as far as I know, my wife's eyes are perfectly well, and she has not been troubled with eye or headache since the operation." Dr. Sargent also wrote at the same time, "Mrs. McL. is entirely free from the annoying and painful symptons of her former trouble and is very well and happy. * * * * The excursions of the eyes inward and outward show normal limits. * * * * I am very grateful to you for the good you have done this patient."

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In the discussion which followed, Dr. Thomas added, that in a paper read before the Medical Society of the State of Pennsylvania in 1894, he had ventured to state his conviction that, "As much, and very much the same kind of, relief is to be expected from the correction of muscular anomalies as from correction of errors of refraction and accommodation, as might be expected from the similarity in the symptoms which these conditions respectively cause." Subsequent observations confirm this belief and he continues of the opinion that muscular errors are neither more nor less important in their relation to asthenopic and general reflex symptoms than are refractive errors; and that equal relief is to be expected in each class of cases from appropriate corrections.

1633 Locust St.

METAMORPHOPSIA.

Below we reproduce a short paper read in the American Ophthalmological Society, in 1875, by Dr. O. F. Wadsworth, Boston. His subject was "The effect of a cylindrical lens, with vertical axis, placed before one eye." Following this we reproduce a part of a paper published four years ago by Dr. R. J. Phillips, Philadelphia, in the *Annals of Ophthalmology and Otology*, on "The ocular perceptions, as influenced by spherical lenses." We introduce these here as a prelude to a more extensive study of Metamorphopsia in the pages of the RECORD. We venture the statement here that the visual changes described by Drs. Wadsworth and Phillips will always remain with the patients, however thoroughly they may become accustomed to them. There are other metamorphopsias that annoy, and yet sooner or later disappear altogether. There are also metamorphopsias that exist without the intervention of lenses and can be corrected alone by lenses. All of these conditions we hope will be fully presented in these pages.—Editor.

"An interesting phenomena in physiological optics, which to me at least, is new, was observed in the following case: Mr. M., a draughtsman, aged twenty-six, consulted me March 6, 1875. The right eye he considered normal. With the left he had never seen well, and it was of little use, but he had noticed no change in it. He hoped a glass might be found to improve the sight of this eye. Functional examination gave: Right, without a glass, $V=\frac{15}{20}$, with—48 cylinder, axis 135° $V=\frac{15}{15}$. This glass, or +48 cylinder axis 45°, increased somewhat the distance at which he could read $1\frac{1}{2}$ Sn. (18″ to 22″). Left, without glass $V=\frac{15}{100}$, with —13 cylinder, axis vertical, $V=\frac{15}{50}$. The fundus appeared normal in both eyes.

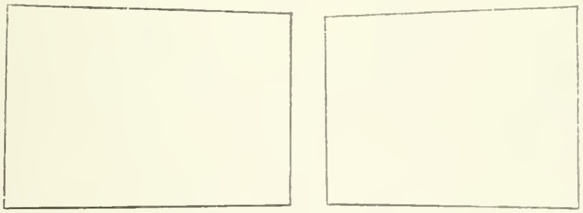
"He was advised to procure a 13 cylinder, axis vertical, for the left eye, and to wear it a certain time each day, while keeping the right eye covered, in the hope that vision might, by this means, gradually be improved. The improvement for the wearer caused by +48 cylinder before the right eye seemed to him sufficient to make it worth while to wear it. The two glasses were therefore ordered—to be placed in separate frames.

"Five days later he came to me again. He had had both glasses placed in the same spectacle frame, and complained that when he kept both eyes open he saw "perspectively," *i.e.*, parallel horizontal lines appear as if they converged towards a vanishing point at the left hand. I found, on examinining him, that this appearance was not very marked, and if the parallel lines were pretty far apart he needed a moment's attention to determine their convergence; but still it was enough to decidedly inconvenience him when at work on plans, etc. Very probably but for his training as a draughtsman, which had taught him accuracy of observation as to the intense relations of lines, the apparent convergence would have passed unnoticed.

"The cause of the phenomena was not first clear to me, but, on consideration, the following explanation appears satisfactory: When, both eyes being normal, an object, for example a parallelogram, is held directly in front of the eyes, perpendicular to the visual axis, the separate images formed upon the two retinæ are not exactly like each other or the object. The left end of the parallelogram being nearer the left eye than the right end, its image on the retina of this eye is larger than the image of the right end, and conversely, the image of the right end of the parallelogram is the larger in the right eye. These two unlike images are unconsciously combined in the brain to give a single visual impression, the smaller end of each single image being fused with the larger end of the other. Under the conditions given, the smaller ends of the two images are equal, so that the average obtained by fusing either large end with the opposite small end is the same, and the impression produced is that of a rectangle.

"If now, a concave cylindrical glass, with vertical axis, is placed in front of one eye, the image for that eye is shortened in the horizontal direction, a portion being cut off from either end, so that the small end is not so small, or the large end so large as those of the image in the other eye. These two unequal images also are combined in the brain to give a single visual impression. Here, however, the average obtained by the fusion of the large end of the longer image with the small end of the shorter image is greater than that obtained by the fusion of the large end of the shorter image with the small end of the longer image; the resulting impression, therefore, is not that of a rectangle, but of a rhomb lying with its smaller end towards the side of the eye before which the glass is placed.

"It is, of course, assured in the above statement that the image formed by the aid of the cylindrical glass is a distinct one, as would be the case if the glass corrected an existing astigmatism.



"To test the correctness of the explanation the accompanying diagrams were constructed to represent the outlines of such images of a parallelogram as would be found in the retinæ of the two eyes under the given conditions. When these diagrams are placed in a stereoscope the result of their fusion is to produce the appearance of a rhomb, its narrower end toward the side on which the shorter figure is situated. The experiment, therefore, supports the theoretical explanation."

This is what Dr. Phillips has to say about

THE OCULAR PERCEPTIONS AS INFLUENCED BY SPHERICAL LENSES.

"We apply convex lenses as a relief to overburdened, or as a substitute for absent, accommodation. These purposes attained, what effect have we produced upon the apparent size, form and distance of surrounding objects? For purposes of study we may make use of Landolt's comparison of the corrected hyperope with the emmetrope using an opera glass. The concave eyepiece of the latter, if considered as a part of the eye, makes the observer hyperopic, and this hyperopia is corrected by the convex object glass, which must be weaker than the concave, because placed so far from the eye. All the characteristics of vision through an opera glass are present in the vision of the corrected hyperope, only less in degree in proportion as his convex glass is weaker and placed nearer his eye. It is not, of course, maintained that all corrected hyperopes will be certain to notice these changes in the appearance of surrounding objects. With weak glasses they are far too slight for appreciation. Where they are so great as to attract notice, however, as with strong convex lenses, or with any convex lens placed far from the cornea, they will be found to result from the same causes and to be explainable in the same manner as their immensely exaggerated counterparts in opera glass vision.

"Every one knows that on looking through an opera glass the size of objects appears increased, while they are apparently brought nearer the observer. Many persons suppose this to be the sum total of the action of the glass, but a little consideration will show that these two illusions cannot be present without being accompanied by several others. Since the enlargement of the retinal image, by which the apparent size of the object is increased, is due to the enlargement of the visual angle by the glass, it is evident that it can affect only two of the dimensions of space; those which lie at right angles to the visual axis. (No enlargement of the visual angle could affect the third dimension coinciding with that axis.) To say, therefore, that a convex glass, or an opera glass, makes objects appear increased in size, is true only of surface, since two dimensions only can be affected by such increase. Not only is the third dimension, coinciding with the visual axis, not increased, but we have just admitted that it appears diminished, since we said that the object was brought nearer, and we have previously seen that the perception of distance of the object from the observer, like the discernment of a nearer and farther boundary of the object, is simply the perception of the third dimension of space. Therefore, in vision through an opera glass, and in less degree in the vision of the corrected hyperope, the two dimensions of space which extend laterally to or cross the line of sight appear increased, while the third, which coincides with that line, appears diminished. It follows, that to the corrected hyperope, a solid object, or a surface lying nearly in the line of sight, will appear distorted in shape. A cube, for instance, will appear longer and higher than it is deep; a square field will appear as an oblong parallelogram, the shorter diameter corresponding to the line of sight. A circular flower bed will appear an ellipse. Moreover, of the distances between objects, some will appear increased while others are diminished. Objects situated on either side of the observer appear farther apart, while those in line directly in front of him appear nearer to each other. Looking at a file of soldiers from one of its ends, the men appear closer together, and the line shorter than it should. Looked at from the front, the line is longer and the men farther apart. This being the case, fewer men can be seen through the convex glass, provided the line is long enough to extend entirely across the field of view, than could be seen through a glass of the same size having plane surfaces. But no more men can be seen beyond the edge of the glass; therefore a certain number are not seen at all. Some man in the line will be the last to be seen by looking through the glass near its edge

Since the line, as seen through the glass, appears lengthened, this man's apparent position is farther to the side than his real one. If farther to the side, it must overlap upon the position of the soldier next to him. This latter soldier will consequently not be seen at all, though his comrades next him on either hand are visible; one through the glass and the other beyond its edge. What is true of the edge of the lens at one point is true of it at every other, and the glass appears, therefore, to be surrounded by an annular hiatus, or gap, in the field of vision. This is readily seen by looking at a row of letters or figures through the edge of a convex lens held some distance in front of the cornea. One or more of the letters are found to be invisible unless the position of the lens is shifted. A ready illustration of what has taken place consists in cutting from a sheet of paper, a disk to represent the portion of the field of view acted upon by the lens. If this disk be enlarged in all diameters it cannot be replaced in the opening from which it was taken, but will overlap upon, and obliterate a ring cf, paper surrounding the opening.

"The increase of one set of distances and the diminution of another set interferes with the estimation of the rapidity of motion. An object moving across the field of view, through one of the magnified diameters, will appear to move faster than it really does, while if moving through the diminished diameter its speed will appear retarded. We have already alluded to the fact that we judge of the rapidity of motion somewhat by the exertion which we see being expended to produce it. If, therefore, an object, as a trotting horse, is travelling in a direction approximating to the line of sight, the corrected hyperope will have presented to him the curious spectacle of a horse exerting himself out of proportion to the progress he is apparently making.

"Still other distortions in familiar objects suggest themselves. Angles will appear more or less acute, according as the line of sight crosses the legs or divides the angle. A right angle will only appear as such when one leg coincides with the visual axis. The relief of objects will appear diminished; letters in high relief will appear in low relief; depressions in surfaces will appear less deep; a sphere will appear more or less like a disk. In the same way that the different parts of a single object lack relief and are reduced to the same level, so the different objects in the field of view are seen in lessened relief. In other words, the perspective is diminished, and as we have seen that this is our principal dependence in judging the depth of the scene before us, that scene appears like an ill-painted picture, which the artist has not had skill enough to make appear at any point to be much farther away than the canvas.

"The disturbance of the perceptions in the correction of myopia is of somewhat greater practical importance than in the case of hyperopia, as strong glasses are more frequently required, and reduction in the size of retinal images is felt to be a disadvantage; which is not the case with their enlargement. The corrected myope has his visual angle diminished by his glass, the diminishing effect being greater in proportion as the glass is stronger, and is placed farther from the eye. Here again we may make use of the comparison, suggested by Landolt, between the corrected myope and the emmetrope looking through an opera glass. But in this instance the instrument must be reversed. The convex object glass being placed next the eye renders it strongly myopic, and this myopia is corrected by the concave glass of the instrument, which must be stronger than the convex, because placed so far from the eye.

"As the enlargement of the visual angle by convex glasses is able to affect only two of the dimensions of space; namely, those at right angles to the line of vision, so the diminution of this angle by concave glasses effects only the same two. These two are, of course, apparently diminished. The third dimension, corresponding to the line of vision, is increased, because the object appears farther away from the observer than before. The appearances presented to the myope are, therefore, directly the contrary of those experienced by the hyperope. Vertical surfaces crossing the line of sight appear diminished in size and thrown back in distance. A horizontal surface, as a square, appears to be a parallelogram, elongated in the direction of the visual axis. A solid body constructed of these surfaces appears distorted; less high and broad than it should, but increased in depth. A cube, as in the case of the hyperope, becomes a parallelopipedon, its longer diameter in this instance coinciding with the visual axis instead of crossing it. The relief of objects is increased; those in low relief appear in high relief, depressions in surface appear deeper. The features of the human face appear more prominent. Objects situated to the right and left of the observer appear nearer together, while those not previously visible are drawn in, as it were, and appear in the field. He is enabled to see each object doubled by looking through the glass near its edge; one image formed by rays coming through the glass, and the other by those which are uninterrupted. Objects situated nearly in the line of vision appear farther apart. An animal moving across the line of sight does not progress with speed commensurate with the rapidity of movement of its limbs; if, however, it changes its direction to that corresponding with the line of sight, it suddenly shoots forward with great rapidity. The linear perspective is greatly increased, the aerial perspective diminished, so that the scene appears to have vast depth, notwithstanding that the component objects are more clearly seen."

WAS IT COCAINE POISONING?

Editor Ophthalmic Record:

Miss L. C., age 20, with dark hair and eyes, of medium size and healthy appearance, came to my office on the 5th inst., to have her eyes examined for asthenopia.

After a preliminary examination I put a gelatine disk containing homatropine alk. gr. $\frac{1}{50}$ and cocaine alk. gr. $\frac{1}{50}$ in each eye at 1:30 p. m. In a few minutes she said the room was too warm, though it did not appear so to me. The door was opened, however, and the room rapidly cooled down, but she became pale, said she was sick, and appeared to be very weak and faint. We helped her across the room to where she could lie down. Her pulse was 60 or 65, weak and compressible. She complained of nausea, vomited a little, there being no appearance of undigested food in the vomited matter. She also had severe griping pains in her bowels.

Having no other preparation of morphia at hand, and not supposing that the little homatropine in the disks had any effect in causing the trouble, I gave her a hypodermic of morphia sul. gr. $\frac{1}{6}$, atropia sul. gr. $\frac{1}{180}$, at 1:50, just twenty minutes after the discs were introduced into the eyes, and ten minutes later, half an ounce of whiskey. She then had a healthy movement from the bowels, felt more comfortable and soon fell asleep from which she was awakened at four o'clock feeling well with a pulse of 85 per minute. She said she was not subject to such spells, and I do not think that nervousness or fear of the mydriatic had any effect in causing this one.

I have heard that as small a quantity as one drop of a four per cent. solution of cocaine (equivalent to $\frac{1}{25}$ gr., which was just the amount in the two discs) dropped into the eye has caused alarming effects, and, therefore, think my case may have been one of cocaine poisoning. At any rate I feel that I shall be a little more chary of it hereafter and try always to be provided with the usual antidotes, amyl nitrite, ammonia, whiskey and morphia when using it.

Would like to know whether you or any of your readers consider this a case of cocaine poisoning, or merely a coincidence?

Yours truly,

A. G. Blincoe.

Bardstown, Ky.

PROGRAMME.

For the Atlanta Meeting of the Ophthalmological Section of the American Medical Association.

LUCIEN HOWE, Chairman. FRANK ALLPORT, Secretary.

Address of Chairman, *Lucien Howe.*

Report of Special Committee on "Detachment of the Retina, its Etiology and Treatment."

Report of Chairman, *R. E. Randolph.* "Histological Changes in Retinal Detachment."

F. C. Hotz. Subject unannounced.

E. E. Holt. Subject unannounced.

F. E. Weeks. Subject unannounced.

T. E. Murrell. Subject unannounced.

John F. Fulton. "Operative Treatment of Detached Retina."

L. F. Love. "Report of a Case of Detached Retina Occurring in Chronic Bright's Disease."

W. T. Montgomery. "Electrolysis in the Treatment of Detached Retina."

E. Oliver Belt. "Consanguineous Marriages as a Cause of Retinitis Pigmentosa."

Dudley S. Reynolds. "The Nomenclature of Conjunctivitis."

F. T. Smith. "The Use of Caustics in Epithelioma of the Lids."

A. E. Prince. "The Treatment of Ectropion of the Lower Lid."

E. J. Bernstein. "Sub-Conjunctival Injections."

F. C. Hotz. "A Case of Ectropion of the Upper and Lower Eyelids."

Louis J. Lautenbach. "Gonnorrhoeal Conjunctivitis, its Treatment."

P. D. Kayser. "Grafting in Blepharoplastics."

Report of Special Committee on "Optic Nerve Atrophy of Obscure Origin."

Report of Chairman, *H. V. Würdemann.* "Cases of Optic Nerve Atrophy of Obscure Origin Occurring in General Diseases."

Geo. E. de Schweinitz. "Obscure Cases of Optic Nerve Atrophy of Toxæmic Origin."

Harry Friedenwald. "Obscure Cases of Optic Nerve Atrophy of Peripheral Origin."

C. W. Kollock. "Obscure Cases of Optic Nerve Atrophy Occuring in Cerebral Diseases."

C. Dunbar Roy. "Obscure Cases of Optic Nerve Atrophy Occurring in Spinal Diseases."

H. Bert Ellis. "Atrophy of Optic Nerve Probably Due to Quinine."

B. Alexander Randall. "The Differential Diagnosis Between Simple Glaucoma and Optic Nerve Atrophy."

S. D. Risley. "Secondary Glaucoma."

Leartus Connor. "Causation and Management of Glaucoma."

Geo. de Schweinitz. "Concerning Central Scotoma, with Particular Relation to the Papillo-Macular Bundle and the Cortical Visual Centres."

R. F. Le Mond. "The Relationship between Diseases of the Eye and Brain."

O. J. Short. "Treatment of Optic Nerve Atrophy by Mercurial Inunctions in Conjunction with the Hot Baths of the Hot Springs of Arkansas."

Edward Jackson. "The Value of Homatropine in the Diagnosis of Ametropia."

G. C. Savage. "Some Interesting Points Pertaining to Refraction."

Casey A. Wood. "The Field of Fixation in its Relation to Heterophoria."

Henry Wilson Ring. "Three Cases of Monocular Vertical Nystagmus."

Herbert Harlan. "A Contribution to the Question of the Removal of the Lens in High Myopia."

Herbert Harlan and Hiram Woods. "Results of an Examination of the Vision of the Children of the Public Schools of Baltimore."

H. Gradle. "Slight Chorio-Retinal Lesion as a Cause of Asthenopia and Reduced Sight."

C. M. Hobby. "The Co-ordination and Inco-ordination of the Eye Muscles."

C. P. Pinckard. "An Ophthalmometric Puzzle."

J. Elliott Colburn. "A Case of Intra-Sclerotic Cyst, and a Case of Cystic Tumor of the Orbit."

Geo. F. Fiske. "Report of Intra-Ocular Malignant Tumors."

S. C. Ayres. "A Case of Chloroma."

A. R. Baker. "Dermoid Tumors of the Cornea."

Arthur C. Hobbs. "The Application of the Galvano-Cautery in Pterygium Operations."

C. D. Westcott. "Keloid of the Cornea."

Lyman Ware. "Report of 100 Cataract Cases with a Special Device for Secondary Cataract."

A. J. Erwin. "A New Needle for Secondary Cataract."

Adeline P. Portman. "Idiopathic Choroiditis."

Hiram Woods. "Report of Some Cases of Choroiditis in Young Adults."

H. Moulton. "Keratitis Interstitialis Annularis."

H. Burt Ellis. "Bilateral Exophthalmus."

J. Herbert Claiborne. "Experiments upon Rabbits, Made with a View to Establishing a Stump for the Better Fitting of Artificial Eyes."

H. B. Young. "A Further Clinical Note on the Use of Pycktannin."

March 15, 1896.

THE OPHTHALMIC RECORD,
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G. C. SAVAGE, M.D., Editor and Publisher,
710 CHURCH STREET, NASHVILLE, TENN.

Special Editions of the Record.

We have decided to adopt a new feature in medical journalism, and have two reasons for doing so. In the first place we wish to stimulate Oculists to write, and in the second place we wish to disseminate more knowledge of ophthalmology among the general practitioners of medicine. To accomplish this double purpose we propose issuing occasionally special editions of the RECORD. The first issue of this kind will be the Tennessee Special Edition. The contributions contained in it will be from oculists who live in different parts of this State. A thousand extra copies of this issue will be run off and mailed to general practitioners within the Volunteer State. The next issue of the kind will be the Eastern Pennsylvania special edition, which will be filled with contributions from oculists in that end of the Key-stone State. Other special editions will be issued at regular or irregular intervals, as circumstances may justify, until the entire country shall have been covered. It seems to us that the double purpose in view could not be accomplished in any better way. The support of our confreres is essential to the success of this new feature. We have already had letters from some of our best men commending the project. We hope in this way to greatly advance the science of ophthalmology, and establish its claims more fully in the minds of our brethren engaged in other departments of practice.

Local Baldness Resulting from an Attempt to Photograph the Brain.

A few weeks ago Dr. W. L. Dudley, Professor of Chemistry in the Medical Department of Vanderbilt University, concluded that he would have Dr. Daniel, Professor of Physics in the Vanderbilt, make an attempt to photograph his brain. The tube was directed towards a point just above, and in front of, the right ear. The exposure was continued for one hour. When the plate was examined no photograph was found, for which a brother physician gave the explanation that the Doctor's skull was too thick. After reporting the experiment as a failure, matters went on as usual with the Professor until a day or two ago, when, to his astonishment, all the hair on that part of the scalp, against which the X Rays had been directed, came out so that now there is an area of baldness about 1½ inches in diameter. The Professor and his friends, of course, trust that this baldness is only temporary, but there is room for reasonable doubt as to the hair ever growing again. It is well known that electrolysis destroys hair bulbs so that they cannot reproduce the growth, and it may be that this effect of the X Rays is akin to what we understand as electrolysis. The Doctor laughingly says that, if any good can come from this accidental discovery he shall be glad, notwithstanding the local baldness which has prematurely come to him.

The Roentgen Rays Put to a New Use.

Once more we propose turning the X rays on the pocketbooks of our delinquent subscribers to see if we can get a photograph of some dollars that are due the RECORD. If this does not succeed our next effort will be to turn these same rays on theirin heads to see if we can find therein an unwillingness on the part of these subscribers to pay. This, of course, will be attended by some risk of producing baldness of that part of the scalp situated over the point of the brain where is located the subscription paying center. But we do not wish to thus afflict any confrere; on the contrary our whole aim is to benefit. A little pink slip is enclosed in the copy sent every delinquent subscriber to which we hope each one will give attention.

The Atlanta Meeting.

The annual meeting of the American Medical Association is near at hand. The officers of the Section of Ophthalmology present in this issue the preliminary program for that meeting. As can readily be seen the meeting promises to be a very interesting one. The RECORD would urge all its readers to attend. Those who have not promised papers might prepare themselves to discuss some of the papers included in the list, and thus add to the interest of the meeting.

THE

OPHTHALMIC RECORD.

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MEDICAL PROGRESS, ITS HELPS AND HINDRANCES.*

BY G. C. SAVAGE, M.D.,

President of the Medical Society of the State of Tennessee..

Medicine, like all other things terrestrial, had its beginning. When disease entered the world, medicine must have been born to meet it. Who first concocted a cooling draught to quench a fevered thirst must forever remain unknown. What the first surgical operation, and by whom performed, is likewise shrouded by the impenetrable gloom of the past. While I would not rob Hypocrates of the honor of being the father of medicine, in that he was probably first to reduce it to a science, nevertheless the generations who preceded him must have been blessed with men skilled to heal, in that they must have been cursed by disease. The depth and extent of their knowledge, measured by the aids they had, must have been little; their skill to use the crude means for cure at their command, could not have surpassed their knowledge of disease. It may be that anciently, inspiration more than investigation made men strong in ability to cure. This generation may learn lessons in hygiene from inspired Moses, who lived and taught before Hygeia was deified.

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*Delivered before the Sixty-third Annual Session of the Medical Society of the State of Tennessee, held at Chattanooga, April 14, 15 and 16, 1896.

But it is not my purpose to trace the progress of medicine from its small beginning, in the remote past, to its present proud position among the great sciences and arts. It is yet an unfinished science, and as an art still imperfect, notwithstanding our multitude of remedies and our surgical appliances by the thousands. Medicine progressed, hindered as she was through many centuries by ignorance and superstition—her chiefest enemies. Within the present century the greatest progress has been made. That the march of medicine will go on until she shall stand a perfected science, I can believe, though this end may not be attained for many centuries to come. I believe the time is coming when the world will be redeemed from ignorance, vice, degradation and disease. Teachers, preachers, lawyers, and doctors will all have much to do in ushering in the millennium.

The reason medicine has advanced most within the century now about to close, is that she has had fewer hindrances and more helps. Superstition, which was an incubus on the chariot of progress in past centuries, dwindled almost to naught before the present century dawned. Ignorance, the mother of superstition, failing in her power to fully nourish her offspring, began to pass into her decline, her power to prevent progress greatly lessened. While the darkness of ignorance and superstition has not entirely disappeared, it has been rendered less potent for harm because of the accummulated light of knowledge with which the world is now flooded.

The conditions which hindered progress in the past, if existting, could hinder now. Unfortunately, some of them do exist, and it is equally certain that they have their retarding influence.

Bigotry, whether characterizing an individual or a class of individuals, in matters medical, never had other than a harmful effect. It would be well if this ill-shaped monster could be forever buried without hope of resurrection. Men who are not willing to accept facts presented by others, and will not weigh the conclusions that have been based upon them, are the men who will not make advances themselves, nor will they be helpful to others who would. Destroy bigotry, and there will be no "pathies," but in their stead would stand one grand brotherhood of physicians. A medical bigot knows not enough to know that he does not know it all; and is, therefore, always ready to destroy anything that does not emanate from a source peculiary his own. Such an one would say: "I will not use this instrument because it was invented by a homœopath; I will not administer that drug because it was introduced by an eclectic; I will not bathe my fevered patients, not give them cooling draughts because this is the method of the hydropath; I will not listen to suggestions coming from the common people." The man who would attain to the greatest wisdom must gather grains of thought from all fields, must use his judgment in separating the good from the bad, and must be willing to feed his fellowmen from his well filled granary. If Jenner had not listened to the stories of the milkmaids, vaccination would not have been discovered; and the era of immunization, inaugurated by Pasteur, but founded on Jenner's discovery, would have been longer delayed. We should never forget that all people are God's people, and that He may use one or another in bringing into the world the good which comes alone from Him. Away with bigotry, and send bigots with it.

Jealousy, although a personal property, can do a general harm. It is always a sign of weakness, and is usually directed against one who is stronger or gives promise of becoming so. Medical jealousy is a medical cur that rarely faces the one whom he would frighten, but watches for his opportunity to slip up from behind, and always with more bark than bite. A timid, though talented man, just entering the field of investigation, may become so frightened by the bark of jealousy as to flee the field and forever fear to enter again. Thus to the world may be lost results that otherwise would have followed. The medical man who is afraid of jealousy deserves pity; the jealous man merits only contempt.

Laziness, an inherited tired feeling, afflicts some men to such as extent that they neither accomplish anything themselves nor do they help others who would do something. This is a sort of passive hindrance to progress, and it is harmful chiefly when it engages in idle conversation, one should be better employed. Of all professions and callings, the lazy man is least at home in medicine.

Carelessness, in more ways than one, may be the means of preventing progress. A careless reader can not get all that may be in the printed page; a careless observer can not properly interpret symptoms, and, therefore, may miss the mark in prescribing remedies. A careless man may have thoughts, but he does not note them, and they fly away, like a beautiful bird, to return his way no more. Such a thought, noted within the pages of a little book, recalled at a more leisure time by a glance of the eye, and amplified by the reasoning powers, might bring strength to the person and progress to the profession.

Indifference about medical matters and medical men is not calculated to give speed to the car of progress. One thus affected may answer promptly all calls from the sick and may relieve them from their sufferings. Every page he reads may bring him profit; every patient may be an open book from whose leaves he gathers useful lessons. He is content with these two sources of information, and what he gets he appropriates to his individual and exclusive use. He counts himself wise without knowing that he is foolish. He is of a few words, and, therefore, appears to be full of wisdom. He meets not with his brethren in medical societies for mutual improvement. His own thoughts he hoards as a miser does his gold. He is conscious of his strength, but he is only too careful not to impart it to others, either by word of mouth or printed page. When he dies the good he has done is buried with him.

Exclusive Medical Organizations are not promotive of progress in the fullest sense. In a science so broad, and with aims so high, narrowness in organization is an abnormality. The few who compose such a society may be the salt of the earth, but their savor is not so likely to be of service as if it were not thus enclosed. A holier-than-thou air emanates from a room containing such a coterie, and this is calculated to cripple the influence of the organization. To be *one* of *one hundred* has in it more sound than sense, and to be proud of such a distinction is more likely to hinder than it is to help the general progress. Such organizations tend towards becoming mutual admiration societies; and the members sometimes may imagine that the great body of physicians on the outside look upon them with admiration and awe. An exclusive organization with a national name is a travesty. It would be far better to say "the *best* one hundred," or "*the* one hundred," which would be a more modest way of putting it.

Vanity in a medical man is not usually well-founded, and is often unregulated. Such a vanity always harms the possessor, and is continually in the way of both personal and general progress. Competition is hateful to such an one, and without competition there can be no progress. If a man, by chance, has one thing that might excite his vanity, he doubtless has something else that should humiliate him. The peacock is proud of his feathers as he spreads them in the sunshine, but is humbled when he sees his feet; yet his feet are more useful to him than his gaudy tail. But prudent, well-governed vanity is a good thing, for with it competition is wedded, and the legitimate offspring of this union is progress.

Common Prejudice of all times, and *Laws* of some civilized countries, have been hindrances. Dissection, vivisection and experimentation, against which the multitude are prejudiced, are as essential to advance in medical knowledge and skill as light, heat and moisture are to the growth of vegetation. If there is any excuse for medical men in politics, it lies in the line of their preventing the enactment of laws that would lock the wheels of medical progress. At this moment the Congress of the United States is being urged by some, who think more of the lower animals than they do of mankind, to enact laws against vivisection in the District of Columbia. If they are succeessful in this, they will conclude that it is just as wrong to cut up a dead man as it is to cut on a live rabbit, and they will ask for laws against dissection. It would be but one step further for them to ask for the enactment of laws against administering medicines to the poor in hospitals, whose virtues had not already been proved on millionaires. Thus encouraged, they would leave Congress and go into our State Legislatures, and plead for the enactment of similar laws. If such laws should ever find their way into our statutes, a strict enforcement of them would put an end to medical progress in this country. Let us hope that the men who make laws for us will not be so barren of brains.

The Public (not all the public), of whom *Preachers* (not all the preachers) form a part, may be the means of hampering medical progress by encouraging quackery, using vile nostrums, and endorsing quack appliances which bear high-sounding names. Serious ailments lead people to think only of men skilled in healing; slight ills, or imaginary afflictions, afford the opportunity to quacks and nostrum dealers to deceive the people, and while under the pall of this deceit they forthwith "certify." If there is a man whom the people deify it is the family physician, and yet they degrade him when they buy a bottled nostrum, visit a quack for free consultation, or wear about them a device that has more name and price than power to do good. Let the people frown on quackery and refuse to buy, then quacks will vanish and the nostrum trade will die.

HELPS.

Some of the specific aids to the medical advancement of the century now about to close may be mentioned:

Anæsthesia, local and general, has been given us, making painless surgery not only a possibility but a reality. While the hint for painless surgery was given more than six thousand years ago, when "the Lord God caused a deep sleep to fall upon Adam, and he slept," while the rib was taken from his side, it will always be a matter of pride to physicians of the South that Long, of Georgia, in 1842, was the first man to produce general anæsthesia, and to do painless surgical operations on sensitive human structure. It will likewise always be a matter of regret, on our part, that his modest nature and retiring disposition prevented his making public, except to a few medical friends, his great discovery, until, after a lapse of four years, Morton, of Massachusetts, announced his independent discovery of anæsthesia. It will always be our pride, as American medical men, to proclaim that our country gave anæsthesia to the world. Without this boon, surgery would have continued painful, and the great progress which has since been made would have been impossible.

Koeller, not then an American citizen, gave us Cocaine as a local anæsthetic, in 1884. In paying homage to him now, in recognition of the good he has conferred on medicine by his discovery, we honor an American citizen, for he resides in Greater New York.

Antisepsis, the introduction of Lister, and its legitimate ougrowth, asepsis, have so lessened the former disastrous results of surgery that the surgeon has been made bold in his operative work. Because of these gains, untold suffering has been relieved; and, in innumerable instances, life has been prolonged. The greatest progress that surgery has ever known has been made within the last half of the nineteenth century, and the two factors that have had the most to do with this progress are anæsthesia and asepsis. A closer study of pathology and symptomatology have aided greatly in the march of surgery.

Electricity, once known only by its riding the storm, leaping from cloud to cloud, and occasionally sending its shivering lance to the earth through some giant oak, a thing of superstition and dread, has been tamed to serve the well and heal the diseased. When Franklin tapped the clouds with his kite, and brought the fiery fluid in a gentle stream down the slender cord to the key in his hand, he dreamed not, that in the nineteenth century, it would be made to light our streets and drive our cars. When Galvani saw the muscles of the dead frog contract and relax under the influence of this subtle agent, he had no thought to what uses it would be put by medicine and surgery ere the dawn of the twentieth century. When Crookes invented his tube, only a few years ago, he did not foresee that, by means of it, Roentgen would be able to make shadowgraphs of things hidden from the light of day. Electricity to-day is one of the invisible forces giving speed and effectiveness to the progess of medicine.

Specialism had its birth in modern times, and has been a most important factor in the advances that our science and art have made. Neurology became a possibility with Wilson's study of the brain, in the seventeenth century; but she did not grow to her present beautiful proportions until the men of the nineteenth century devoted their time and talents to perfecting the work begun so long ago. McDowell's boldness in opening the abdomen of his Kentucky patient led men to a more careful study of the pelvic and abdominal organs, and made gynecology and abdominal surgery a possibility. Who does not admire the men in this specialty for their boldness in operative procedure, and their daring in the coinage of terms.

Helmholtz's invention of the ophthalmoscope, in 1851, created modern ophthalmology, and gave to medicine one of its most useful branches. It bears to-day the proud distinction of being more nearly founded on a purely scientific basis than any other department of medicine. Proud of her progress and position, she is humiliated only by the fact that gynecology, her younger sister, has far surpassed her in adding long and high-sounding names to the medical vocabulary. Other specialties might be mentioned that have done much in advancing medicine.

The Drug Supply of this century has had much to do with therapeutic progress. The mineral and vegetable kingdoms have been free in their gifts of remedies for human ills. Coal, taken from the bosom of the earth, has yielded her products for easing pain and reducing temperature. The cinchona tree, wrapped in her medicated bark, stood for centuries ready to give the antidote for malaria; but this power was unknown and unused until modern times. The oils and juices of a thousand plants have given to medicine their powers to destroy germs or neutralize their ptomaines. While much has been given for the asking, much more remains to yield disease-preventing and health-restoring power to the earnest, active searcher into nature's secret resources. On the mountain tops, on the sloping hills, and in the valleys of Tennessee there may be plants growing whose properties, if known and used, would surpass in power to prevent or cure disease anything that has ever been brought from any clime. How these secret forces may be extorted from nature's hidden grasp, and by whom they shall be given to medicine, remains to be seen. Some of our young men within the coming year may woo the forest and the field, and win therefrom something new that will be of service to the suffering world.

Rivalry in investigation is one factor in the march of progress. One possessed of this quality, like the mastiff, is conscious of his strength, and faces him whom he opposes. He imparts some of his own courage to his contestant. At the end of the contest right wins, and the late contestants should enjoy the results together.

Energy and *Industry* are more powerful in the life-work of a physician than are the circumstance of high birth and the environment of great wealth. The story of the lives of America's most noted medical men tell us too plainly that they were not born into the proud positions that they attained; and they were not wafted there by some gentle, uplifting breeze. At least one of the most noted medical men the South ever produced spent his earlier days on the old farm, among the pines of South Carolina. Fired with the thought that there was a greater work in a broader field awaiting him, he left the old home with only a few dollars in his pocket, and walked the weary miles that intervened between that home and the city of Charleston, that he might there commence his medical education. A less promising outlook could have hardly presented itself. His inborn capacity for work was not allowed by him to remain dormant, but his acquired habits of industry made of him the power which he became. Couple industry and capacity together, no mountain is so high that it may not be climbed; no plain so wide that it may not be traversed. By such an one every opportunity is transformed into utility; every obstacle is brushed aside with the broom of determination.

If all the latent energy—the inborn capacity—of medical men could be transformed into manifest power, by the magic touch of the hand of industry, no cyclometer could record the revolutions of the wheels of medical progress.

Medical Colleges have aided in the progress of the past, are doing better work in the present, and will accomplish still greater good in the years to come. The medical schools of to-day are greatly in advance of those of even a decade ago; and the best schools of one hundred years ago are as nothing in comparison with the most advanced schools of to-day. If the medical colleges of the past, with their limited facilities for imparting instruction, turned out men who grew to be giants, what ought the schools of to-day do? Men towering above their fellows in medicine in past centuries were few, and because of their fewness they attracted the greater attention. Larger medical giants, but more of them, are found in modern medicine. They attract less attention than in the past because they are so much more numerous. Our great men of to-day far surpass the greatest of other centuries, both in the depth and extent of their knowledge and in their power to apply it. Graduates of a few weeks ago know more of medicine than Galen ever dreamed of.

While medical colleges are still not perfect, and should be improved on many lines, a greater care should be exercised in scrutinizing applicants for admission. A man to enter on the study of medicine should have much of the quality known as "mother wit," or common sense; he should be trained in literature and the sciences, at least up to the point of development of his thinking powers; not only should he be mentally sound, but he should also be morally pure; and he should feel towards medicine somewhat as Paul felt when contemplating the ministry: Woe is me if I practice not medicine. No young man should be encouraged to wield the surgeon's knife or dole out doses for disease who is better fitted by nature and acquirements to tend sheep on the hillsides, or herd cattle on the plains; to build houses for the people to live in, or make clothes for them to wear;

to construct cars for commerce, or man ocean steamers. There are a thousand and one callings in life ready to honor men, and from which men can get honor, if they faithfully follow them.

The Medical Society is one of the most powerful factors of personal and general progress. Its existence pre-supposes that the members have accomplished all that is required of them in the prescribed course of a medical college. There may be never so much fire in flint, yet without friction it cannot be called forth. The medical society is designed to bring out the fire of thought from the reasoning centers. The ideal medical association probably never had an existence, and yet it is a possibility. It is not my purpose to depict a perfect organization. The chief design of every medical society should be the advancement of knowledge and the enhancement of skill. Its doors should be wide open to all honorable members of the profession in the territory it covers. Bigotry and envy should not only not be placed to guard these portals, but they themselves should be prevented from entering, because both are enemies to progress. The pass-word should be "honorable medicine," and the motto should be, "we will walk peacefully together in the pathway of progress."

A rightly organized and properly conducted local society contains the germ of power. Each member, like children of one family, feels at home, and basks in all the freedom and ease that the word home implies. They get training in this school that fits them for the college of the district or state society, where they may find even broader and better opportunites for advancement. The smaller organization should bear a definite relationship to the larger, and their workings should be harmonious. Both should be governed by laws having in them the same spirit of progress. Continuing in training in the local and state societies, every honorable medical man should join his powers with those of his fellows in perfecting the national organization. What a power these several organizations would become if only their full importance was appreciated by all members of the profession and by the laity. Some good but misguided men will not attend medical meetings. One does not often read in the obituary of such a man that he invented a lever for lifting the world of medicine to a higher plane. The immediate duty a physician owes to the public will often prevent his attendance at medical meetings; but when he can attend, and does not, he fails in the performance of a duty he owes to the public, to the profession, and to himself. May the day speedily come when medicine can claim an organization in every city and county; when state societies shall have on their roll the names of all members of every local organization; when that grand body, the American Medical Association, shall be constituted of all the members of all the state societies.

Medical Journals are streams of water for irrigating the garden of thought. The vitalizing fluid of the profession is continually coursing through the pages of our periodic literature. Sometimes this stream is poisoned by the plasmodium of egotism, which now and then gives the reader a chill; sometimes it is made to lose its strength-giving power by the germs of the envious or the spores of one gifted in ridiculing. With all their faults journals are a necessary factor in the progress of medicine. If they were fewer in number they might be better. If those who imagine themselves gifted with editorial powers were really thus endowed, journalism would be on a higher plain. Fortunately the law of the survival of the fittest is continually doing its work. While a man is expected to buy the journal he reads, he is not compelled to read all that he buys. The wise reader separates the trash from the treasure, and appropriates only the latter. One of the duties of the editor, which is too often neglected, is to refuse the bad and infuse the good. He must read all that he would publish, and should always have the courage to endorse the true and condemn the false. This he can do in editorial or in head-line. At a feast, the host cannot equally commend all the viands he may place before his guests; but his action would be condemned should he set before them a dish he might know to be dangerous. But after all, the mental pabulum offered in medical periodicals is made up largely of contributions from subscribers. How much better would these contributions be if the prime object in presenting them was the making of leaves, in medical literature, for the healing of the people. The mission of the medical journal will not be brought to an end until medicine shall stand a perfected science.

Books are as essential to medical life and activity as bread is to physical force. Books may be poor in matter and style as bread may be bad in quality and kind. As bad bread brings physical discomfort and predisposes to physical inactivity, so a poor book depresses mental power. Discretion in the buying of books is a necessity; the buying and the reading of good books tends only towards advancement. A good book is a store-house in which is garnered the good and the true of the past and the present; a treasure-house from which all may draw without danger of exhausting. Of the making of books there is no end. Even one's enemy may write a book, if so to him, of course, the book would be a bad one. While the profession cannot limit the making of books it is fortunate that it can control, to a large extent, the sale. Unprofitable books die with the first edition unexhausted, bequeathing to their authors no estate. The truths contained in good books will endure while time lasts. An individual book may not reach many editions, but their contents in some other form will extend across the stretch of time, and will always add to the speed of progress.

Enthusiasm has always been and will always be the spirit of progress. Its correct meaning is not always in the mind of the man who uses the word. The term crank or maniac would aptly apply to some who are mis-called enthusiasts. If we mean what we say, when we call a man an enthusiast, when before him we should have a feeling akin to that which possessed Moses when he stood before the burning bush, for he knew that God was in it. Not less certainly is God in the genuine enthusiast, burning within him, but not consuming him, a marvel to angels and men. It was in the power of Moses to have laughed at the bush ablaze, and to have walked from it with covered feet; but if he had so acted he would never have learned the lessons that made him the leader of his people, and the framer of laws for the nations of all subsequent time. The wisest as well as the humblest may learn lessons from the enthusiast that will be both helpful and enduring. Deliver medicine from cranks and maniacs who can but retard her progress, but give her more men who believe that God is the author of all truth, and that for the general good of mankind he sometimes takes up his abode in a man, firing him with an almost consuming zeal. When studying the firmament, of medicine, would that we could all cry out with the astronomer, as he gazed upon the stars, "O God! I am reading thy thoughts after thee." The plan of redeeming the people from disease is of divinity, as is the saving of their souls from damnation.

The general progress in medicine is only the sum total of the progress of individual medical men. Throughout the history of medicine there have been men who created epochs and inaugurated eras. Harvey's discovery of the circulation of the blood was an epoch, prior to which medical thought groped in an uncertain light. The era of rational medicine dawned when Harvey enunciated the result of his investigation. The wonder has never ceased that the circulation of the blood remained so long unknown. Jenner's discovery of vaccination marked an epoch, but the era of immunization starting with it, continued in its morning twilight until the work of Pasteur caused it to break forth into the brightness of day. The noon-day of this era has not yet arrived. Throughout the coming centuries men, imbued with the spirit of Pasteur's work, will go on investigating with the microscope and test tube, until, in due time, the people who will, may become immune from disease.

The medical world stood still when told the story of McDowell's daring, and she has not yet recovered from the astonishment excited by the brilliancy of the era of abdominal surgery, which he inaugurated. The wonder will never cease, that for so many centuries, appendicitis and ovarian growths were permitted to send their victims trooping to an untimely grave, because of the unfounded fear that a puncture of the peritoneum meant death to the victim.

Thus we might speak of scores of epochs, and the eras that have followed them. The men who moved in these matters simply uncovered principles as old as creation. The streams which they tapped, when opening these well-springs, had always been connected with the great ocean of truth, and were only just beneath the surface. Thirsting for these waters, God-guided, they dug deep enough to find them. Medicine and the world have been made richer by their labors.

Not all the hidden streams of truth have yet been found. May it be the happy fortune of some who hear me to open up new fountains for refreshing the world.

Do we look longingly to the proud position of men who have attained eminence in medicine, without a thought of the rugged pathway they had to travel? We could not enjoy the one if we would shrink from the other. Men must labor to climb, and wait to reach, the mountain-tops of greatest usefulness.

Throughout the centuries medicine has been building her own monument. Before Harvey, the work done only served to clear the ground and prepare the foundation. The corner-stone of the superstructure is Harvey's discovery. Stone after stone has been added as discoveries have been made. As each tier stands completed, there is room for fewer stones in the one to follow. Some unenduring stones have been placed, but they have served to let the building go on. The rain of observation, clinical experience, and legitimate criticism will cause the inscriptions on unsound stones to fade away and the stones themselves to crumble. Other workmen will be ready to remove these, and in their places put material that will be more enduring. Some inscriptions will grow dim from the accumulated dust of neglect, but some one will come along, and with the breath of enquiry will blow the dust away and will make the reading clear and sharp again. The work of building goes on, some of the workmen preparing stones to place in the superstructure, but the great majority furnishing the uplifting power of encouragement and the cement of coöperation. The time will come when this monument will be ready for the placing of the capstone. This ceremony commemorating the final discovery necessary for making the science of medicine complete, will be performed as the millennium dawns, amid the applause of a world redeemed from disease.

CONVERGENT CONCOMITANT STRABISMUS, ETIOLOGY AND TREATMENT.

By G. W. HALE. M D., Nashville, Tenn.

Often times more than one cause is operative in the production of strabismus. The earlier in life these causes act, the more likely they are to produce the above result. By that I mean that a given cause or number of causes operating when the function of binocular vision is being formed, is much more likely to produce strabismus, than would these same causes, operating later in life, after this function has become permanently established. The remembrance of that fact by physicians as an whole, and the giving of judicious advise based upon it might save many a child from strabismus later in life.

Up to Donders' time the cause of strabismus was supposed by most writers to reside in the muscles themselves. His observation and experiments taught him otherwise. He was the first to discover that a large per cent. of squinting children were hypermetropic. From this fact he deduced the theory, (which is a beautiful one and is supposed to have much truth in it). that it was the act of overcoming the hypermetropia which produced the squint. He reasoned in this manner, all hypermetropic children have to exercise an abnormal amount of accommodation in order to see well, even at a distance; as the object is brought nearer the eye, that strain is increased. Now, there exists a certain connection between accommodation and convergence, the more we converge the greater will be our power of accommodation, and vice versa. Consequently when the child finds it necessary to exert his accommodation powerfully, in order that he may have distinct image of the near object, he also discovers that if he converges a little more, the muscle of accommodation will act more pronounced and give him a better image. But this excessive convergence causes the lines of vision of the two eyes to cross, and double vision is a consequence. The child has now to choose between binocular indistinct and monocular distinct vision, with a squint. He prefers the latter. That, as I have said, is a beautiful theory, and is supposed to account for a certain number of squints which we encounter, but it does not for all.

Nearly all the human race are hypermetropic in childhood. Now if hypermetropia produces squint in certain children, why does it not do it in all who are hypermetropic? Possiby no satisfactory answer has been given. Donders explained it by the size of the angle a. His explanation is unquestionably not correct.

Donders, in common with many who have followed him, supposed that as hypermetropia tended to produce squint, it was more likely to produce it on those children where from some cause, one eye had much better vision than the other. The poorer eye being of less consequence in binocular vision, assumed the extra amount of convergence necessary in order to give distinct vision in its fellow. It mattered little what the cause of the bad vision might be, whether opacities of the cornea, high degree of hypermetropia or astigmatism or some lesion of the fundus.

There are probably many oculists, who believe that every squinting eye had bad vision, before it deviated. They will not accept the amblyopia ex-anopsia theory.

If hypermetropia alone can produce squint, and if hypermetropia combined with bad vision of one eye, also is its cause, we might naturally reason that all children with bad vision in one eye, who were hypermetropic would of necessity squint. Such however is not the case. Schweigger alone presents forty-six cases of the above conditions, none of whom had squint. Many writers have studied the relation existing between adduction and abduction, in order to there find a cause for a certain per cent. of squints which they could not account for by hypermetropia or amblyopia. Others have taxed their ingenuity considerably in fitting myopia to squint. Such cases exist and they must have an explanation.

There may be various other causes, which may act to produce it in any particular case, such as a deviated septum from an accident, the squint coming on soon after the accident and remaining as long as the deviation existed.

In the September and October numbers of *Annals d'Oculistique* for 1891, H. Parinand set forth his views of the causes which produce concomitant squint. They offer to me the only rational explanation of all the phenomena observed in the above condition. So to the above mentioned gentleman should be given the credit of much which will follow.

Concomitant strabismus should be considered as a defect in development of binocular vision.

The phenomena of binocular vision comprehends two separate and distinct parts of the economy. One, the muscles, and the nervous centers, which furnish the required power for their proper innervation. The other, the organs of special sense, the retinæ and the nervous centres which receive the impression.

The functions of these two systems are intimately united as they are developed. As the strabismus becomes fully developed it becomes a cause of the imperfect development of the organs of special sense, and vice versa, the badly developed special sense may be a cause of strabismus. We are born with a framework of these two functions, which we can perfect by exercise; we also have the power of developing one, to the detriment of the other. This fact often plays an important part in strabismus. All things which interfere with the establishment of binocular vision may become a cause of strabismus. The earlier in life they occur the more potent factors they are. These causes are of two kinds, the one pertaining to the eye itself, the other to the brain. Among the ocular causes, are errors of refraction, bad acuity and unequal acuity of vision in the two eyes. All affections which hinder the perfect development of the brain of the child are liable to become factors in the production of squint. Heredity may become a cause, viz.: by the transmission of errors of refraction, also by bad brain development.

Everything is plain in the etiology of strabismus as soon as we admit a double innervation of the internal recti. One for the lateral movement of the eyes, the other for the movement of convergence. It is the innervation of convergence alone which is modified in strabismus, that for the nucleus which move the eyes in other directions, remains intact.

Now the innervation of convergence is essentially the innervation of binocular vision, and all causes of strabismus, whether they are central or peripheric, tend to modify this innervation. On that, and that alone, rest the influences which produce strabismus.

By this you are able to explain how such very dissimilar causes, as errors of refraction and corneal opacities, produce the same result.

If the above is true the etiology of strabismus reduces itself to determining how the various causes modify the innervation of convergence.

The theory of Donders, before referred to, I do not accept as the true explanation of the reason for hypermetropia being associated with squint. Were it true, all hypermetropes should squint. That is just the point which troubled Donders, and in act every writer since his day, and as far as my knowledge goes, none of them have ever been able to explain it satisfactorily.

No less a writer than Landolt says on this point, "not any of the thories which we have enumerated fully satisfy us, and we prefer to acknowledge that certain of these conditions are beyond us."

In place of assuming that all hypermetropes should squint, and so have to find an explanation for the fact that the larger portion do not, we had better say, that hypermetropia should not squint, and search for the cause of its appearance in a very limited number.

In order that good binocular vision may be sustained by those suffering from an error of refraction and by the presbyope, there must be an incessant adaptation of the two forces, convergence and accommodation. It is unquestionably on account of this adaptation that the majority of ametropia do not squint, but enjoy good binocular vision. That adaptation is the rule, squint the exception, and this occurs in those who are unable to bring about the required adaptation.

Only in that manner can we account for the disappearance of convergent squint in the myope when his error of refraction is corrected. That we all have seen. It also explains the converse of the above, viz.: The disappearance of a beginning divergence in the hypermetrope when his ametropia is corrected.

Most writers take the position that bad vision of one eye is one of the causes of squint, not an effect. The bad vision, which has a tendency to aid in the production of squint, is that which exists in infancy, and it produces its effect by enfeebling the power of fusing the images. The cases where binocular vision is very imperfect, without squint, are more numerous than most of us suppose. The same is true of irregularity of vision. Corneal opacities act in the same manner, viz: by a reduction of visual acuity.

Occlusion of one eye for a considerable length of time has been known to produce squint, even when the eye has recovered without any corneal opacities or change in its visual acuity. All these causes, hypermetropia, myopia, unequal vision of the two eyes, corneal opacities, occlusion of one eye, act in a similar manner, as obstacles to binocular vision. They produce deviation by interfering with the innervation of convergence, and act almost exclusively in childhood, when the function of binocular vision is being developed.

There is some difference in their action, whereas hypermetropia acts directly on the innervation of convergence, on account of the relation which exists between convergence and accommodation. The others act more indirectly on the organs of sensibility, by enfeebling the tendency to fusion. The influence of cerebral affections on the production of squint are undoubted, especially those of childhood. It is not at all uncommon to find a periodic squint following the hydrocephalus of a meningitis. Some writers have laid great stress on what they call neuropathic strabismus, in which the nervous temperament plays an important part. Most certainly all conditions of ill health may prove factors in the development of this condition. It is not rare to have a squint, which we had supposed cured, to show itself under some bad general condition of the system. These same conditions may bring out what might be called a latent squint. True nervous people do develop apparent insufficiencies of the ocular muscles, which are quite annoying, both to patient and doctor, but they do not end in squint, as far as my knowledge goes. Concomitant strabismus is not an accidental affection, it is a vice of development which always begins early in life.

There are many other causes, which at various times, have been brought forward to account for squint. Hire contended that the sensitive part of the retina was prolonged from the macula and that the eye deviated in order to utilize the most sensitive portion. More recently Landolt has advanced a similar theory. They are probably all erroneous and are secondary phenomena, resulting from a fault in the development of binocular vision.

Before one undertakes to do anything for the relief of squint, he should thoroughly master the theoretical portion of the subject. Nothing is more dangerous than to attack a child suffering from squint, seeing only the possibilty of putting the eye parallel by an operation. True the operation is a trivial one, which any surgeon or doctor may undertake with very little preparation. He can also assure the parents that after one or more tenotomies he will leave the eyes parallel. But will they remain so? *No.* Not unless he has carefully studied all the phenomena pertaining to the development of this individual case, and relieved such as are susceptible of relief by other means, before his operation is undertaken. Unless he has taken these precautions he can or should count on a divergence later on. No one can say just when—it may be one year, it may be five—but it will almost certainly come.

If the theory of the production of squint which I have presented is the true one, then every child, as soon as it shows any tendency to periodic squint, should be placed in competent hands, who should investigate, not only all eye conditions, but also any abnormal brain workings. In fact everything which may by any chance interfere with the establishment of binocular vision should be removed if possible, or modified to a greater or less extent, providing its removal can not be accomplished.

It goes without saying, that the larger proportion of very young children, who show a disposition to squint periodically, will be found to be sufferers from some error of refraction. The child should be put under atropia at once, the error determined, corrected by the proper glasses, and the child made to wear them constantly. By so doing you may remove the cause which is interfering with the establishment of the function of binocular vision. If, later in life, the function becomes well established, the glasses may be laid aside, providing there is no tendency to converge when they are removed. Whatever preconceived opinions we have had on the point of young children outgrowing squint, we should lay them aside and give the child all the chances. Some of them do outgrow it, but only those who are able to overcome the obstacles to binocular vision, the remainder become permanent squinters. Had we given them a little aid at the proper time, all, or nearly all, might have escaped.

If the squint has become permanently established with the vision of the squinting eye much reduced when we first see the child, it still becomes our duty to investigate the refraction, correcting it if we find an error, thereby hoping that the convergence may disappear to a greater or less extent, as they continue to wear the glasses. These should be worn from one to twelve months, depending on circumstances.

If all convergence disappears under the use of the glasses, well and good, if a portion still remains, at the proper time a tenotomy should be done. This may be a simple tenotomy of the internal rectus of the squinting eye, or combined with a like operation on the internal rectus of the other eye. Or again, a simple tenotomy of the internal of the squinting eye, combined with an advancement of external rectus of same eye. Just which operation or operations shall be done must be determined by the conditions at the time. In a general way I would say that if there was good vision in each eye, the probabilities are that a tenotomy of one or both interni would be all sufficient. If, on the contrary, the squinting eye was amplyopic, probably better results will be attained by combining an advance of the external rectus of the squinting eye, at same time that a tenotomy of interior is done.

Javal's orthoptic training may do much towards the cure of low degrees of squint, it is also an aid after operations, where a slight degree of convergence remains. A description of the necessary apparatus is to be found in many of the text-books, so I only refer to it.

I wish to emphasize what has been referred to in the first part of this paper, that whenever a child is observed to be squinting periodically, it should be the duty of the first physician who observesit, or has his attention called to it, to tell the parents the *truth*, which is that there is danger of the squint becoming permanent. Do not allow them to suppose that it is a slight affair which the child will outgrow as it becomes older. True, a certain number do outgrow it, in the manner above described, but only a small proportion. No gentleman should care to have the responsibility of a single case of squint charged to him, when a little judicious advice, at the proper time, might have obviated all the difficulty.

MANAGEMENT OF REMAINING CORTEX AFTER CATARACT EXTRACTION.

By T HILLIARD WOOD, M.D.

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In any of the ordinary operations for cataract extraction the lens is loosened from its capsule and expelled through an incision made near the periphery of the cornea. As the lens leaves its capsule some of its fibers may remain attached to that membrane; or, in escaping through the incision, more or less of the outer layers of the lens are frequently scraped off by the lips of the corneal incision. These fragments of lens remaining within the eye are known as "remaining cortex."

It is to this "remaining cortex" that I wish to call attention. The amount of this lens debris varies with the size of the corneal incision, and with the size, firmness and maturity of the cataract. With a small corneal incision more of the cortex is scraped off than with a larger opening. So, *cœteris paribus*, the larger, softer or less mature the cataract, the more cortex will be retained. While the amount varies with the above conditions, yet in the majority of extractions there is enough of this cortex retained to diminish, or defeat the success of the operation unless it is removed.

There are three ways in which this cortex, when retained, may become hurtful: (*a*) by acting as a foreign body it irritates the iris, setting up iritis; (*b*) by its opacity it interferes with the transmission of light; (*c*) by becoming incarcerated in the corneal incision it delays union. So serious is the danger from this cortex that it constitutes the main reason against the extraction of an unripe cataract. Because if extraction be done upon an unripe cataract the outer transparent layers of the lens may either remain adherent to the capsule or are scraped off by the lips of the corneal incision. But this cortex so retained is transparent and so invisible; therefore it is not seen by the operator at the time, and consequently is left in the aqueous chambers and the eye closed. Some days later when the eye is inspected the cortex, having become opaque by exposure to the aqueous, is plainly visible, but cannot then be removed except by another operation. On the other hand, if extraction be done on a ripe cataract the remaining cortex is white, therefore visible, and thus being aware of its presence the operator can remove it before closing the eye.

The amount of injury from this cortex is influenced by the age of the patient and the form of the capsulotomy. The younger the patient the more tolerant the iris of the cortex, and the greater the probability of the latter's absorption. As to the second point, if the capsule is opened at its upper periphery by a semi-circular incision the cortex, being retained within the sack of the capsule, does no directly touch the iris. Hence there is less danger of iritis (Knapp). But even here the co-r tex being, or becoming, opaque interferes with the transmission of light, and necessitates a subsequent discission. But if the capsulotomy be the ordinary crucial, quadrangular or T shaped cut, the cortex has free access to the iris. Hence iritis is readily produced.

From the foregoing facts it will be seen that I regard the easy, safe and complete removal of "remaining cortex" as an important step in cataract extraction.

To accomplish this either one of two measures may be employed. One is rotatory massage and the other is irrigation.

In performing rotatory massage, after the body of the lens is expelled, the lids are closed and with the finger gentle rotatory pressure is exerted through the lids on the ball. By this the fragments of cortex may be collected together and made to present at the incision, thereby causing the wound to gape. The cortex may escape, or may be teased out with bits of moist antiseptic cotton.

By this method pressure is made on the ball, and this pressure may be harmful in case there is prolapse of either the iris, or the vitreous. Moreover the pressure often fails to remove all of the cortex. So it may become dangerous, and is often incomplete.

In contrast with this I wish to call attention to irrigation. In irrigation a small stream of water is injected into the aqueous chambers, and with the returning current comes the debris of the lens. In carrying this out either a small piston syringe or a miniature fountain syringe may be employed. My own preference is for a miniature fountain syringe. The reservoir should have a capacity of two ounces, and the rubber tube be some fifteen inches long. The nozzle should be made of metal, and about four inches long. It should be bent in the middle to an angle of 130°. The extreme end of the nozzle should be oval in shape, measuring three mm. in width by one mm. in thickness. This shaped nozzle makes it easy of introduction flatwise into the anterior chamber, when by turning it on the edge it makes the incision gape and so affords a ready exit for both the returning current and lens debris.

Of the solutions used for this purpose, three deserve special mention, viz.: Sol. biniodide mercury; sol. boracic acid; and sol. sodium chloride. Of these the mercurial solution 1-10000 to

1-20000 (Panas) has been freely used. The objections to it are that it may not only prove irritating to the iris, but its use is sometimes followed by inflammation of Descemet's membrane with deep corneal opacities.

The boracic acid solution ½ to 1%, is often used and is free from the objections urged against the mercurial solution.

But the solution I like better than any other is that of sodium chloride ½%. I was led to use this by reflecting upon the chemical composition of aq. humor which is a solution of sodium chloride. This salt solution therefore being practically of the same composition as the aqueous, the fluid normally bathing the anterior and posterior chambers, ought theoretically to be non-irritating, and in the frequent use of it, for more than two years, I have found this to be true in practice.

It should be borne in mind just here that it is not necessary to use an *antiseptic* fluid; because the aqueous chambers are not supposed to contain germs. But the fluid should be aseptic, so as not to introduce germs. For this reason the salt solution should always be made fresh, filtered and boiled just before using. In other words the object in using irrigation is not to destroy germs, but to wash out fragments of the lens.

Whatever solution is used should be at 100° F. so as not to affect adversely, by its temperature, the delicate intra-ocular tissues. It is my rule to have the above salt solution, with my small fountain syringe carefully sterilized, ready as part of my preparation for each extraction.

After the lens is expelled, if fragments remain, I introduce the nozzle flatwise *into the anterior chamber*. Then turning the nozzle edgewise the wound gapes, thus making a free aperture for the exit of the returning current and fragments of the lens. The first few drops of the injection will often wash out all of the remaining cortex. If any fragment of lens is seen to remain attached, the stream may be directed against it, when it will loosen and come away. Or if the cortex be in the posteso effective; and second, it may force germs from the conjunctiva into the aq. chamber (Knapp).

It has been urged against irrigation that it causes punctate opacities of Descemet's membrane and iritis. To the first objection I would say it is only after using sol. mercuric biniodide that those opacities have occasionally occured, and for this reason I do not use that solution. To the second objection I would answer that the salt solution at 100° F. properly used is much less likely to produce iritis than is the irritating cortex if allowed to remain.

Among the advantages possessed by irrigation is that of restoring a prolapse of the iris, and bringing about a central, circular and contracted pupil. And in escape of vitreous it is perhaps the only safe method of removing cortex.

There is yet another class of cases in which irrigation is most valuable. I refer to those cataracts in young adults where the nucleus is too hard to be dissolved by the aq., and removed by absorption, and yet the cortex is so soft that the lens cannot be extracted *en masse*. If we attempt extraction in these cases the nucleus will be expelled, but the cortex will remain behind as a semi-liquid, gruelly mass. It was in such cases that suction through a tube introduced into the anterior chamber was formerly employed. But better than this is irrigation, which rapidly and completely clears the entire aq. chamber of all cortex. This, it seems to me, is one of the most valuable uses of irrigation, for it puts into the legitimate field of rapid and complete extraction many cases that would otherwise be treated by slow, dangerous and doubtful absorption. Again in traumatic cataracts of the young, where the cornea and iris are often wounded, and complete extraction is made difficult, because of the softness of the lens, irrigation is most valuable. In slowly ripening, immature senile cataract, in that class of cases in which artificial ripening is sometimes done, extraction with irrigation is rapid and, I think, the safer method. After the free use of irririor aq. chamber the stream should be directed into this through the pupil, when the iris will balloon forward, and the cortex come through the pupil and escape through the incision. In using this method I have never failed to remove easily and rapidly all of the cortex and leave the pupil perfectly black.

Some able operators do not enter the anterior chamber with the nozzle, but simply direct the stream against the corneal incision. This I think is open to two objections; first, it is not gation in such cases we may be reasonably certain that no transparent cortex remains.

I have used irrigation for two years in all the classes of cases referred to in this paper and have only favorable reports to make. It is not necessary in every extraction, but in many it is very useful, and in some it is essential to success.

246½ N. Summer Street.

SOME CASES OF A HIGH DEGREE OF HETEROPHORIA WITHOUT SYMPTOMS.

By E. C. ELLETT, M.D.,

Ophthalmic and Aural Surgeon to St. Joseph's Hospital, Memphis. Formerly House Surgeon in Will's Eye Hospital, Philadelphia.

My personal experience has never impressed me with the necessity for so many graduated tenotomies as some find indications for doing, and I am pleased to see the pendulum swinging towards conservatism as regards the operative treatment of these cases, toward relying more on careful correction of refractive errors, supplemented by exercise of the weak muscles and training of faulty nerve centers, and not so much on operations to reduce the strength of the opposing, and probably normal, muscle to a point where it can no longer predominate over its weak antagonist. It is a matter of common observation that heterophoria of moderate degree, that is 1° or 2° of esophoria at 6 meters, and as much or twice as much exophoria at 33 centimeters, is as much the rule as small errors of refraction and the cause of less trouble, so little, in fact, that we seldom attempt their correction. I want to record four cases to show that high degrees of muscular error may be equally inocuous.

In all of these cases the error was esophoria, and not less than 10° in any case. Two of the cases were myopic and two were hyperopic. In one case a complicating hyperphoria existed, but in none was muscular asthenopia present.

CASE I. Mrs. M., aet. 22, was referred to me by Dr. Farrington. She was in splendid health, and was as perfect a physical specimen as one could wish to see. She complained that on using her eyes the letters would blur very soon, and she had some ocular pain. She had worn glasses for reading, but never constantly, for many years, and then had + S 1.50 D from an optician.

O. D. $\frac{20}{20}$ P. O.S. $\frac{20}{20}$ P. Holds Ji. momentarily with either eye.

Ophthalmoscope. Hyperopia.

Ophthalmometer. O. D. + .50 D 90°—180° with.

O. S. + 1.00 D 90°—180° with.

Muscles. Adduction 25°, abduction 4°, at 20′, 13° esophoria—at 14″, 5° esophoria.

Under Homatropine—

O. D. $\frac{10}{cc}$ + S 5.50 ⌢ + cy. 0.75 ax. 30°=$\frac{20}{20}$.

O. S. $\frac{5}{cc}$ + S 6.50=$\frac{20}{20}$ P.

With the accommodation relaxed by homatropine there was no lateral heterophoria at 20′. After the mydriatic passed off she accepted, and was given O. D. + S 3.00 ⌢ + cy. 0.75 ax. 30°.

O. S. + S 4.00, for constant wear.

With this correction she had 5° esophoria at 20′, and 6° exophoria at 14″—

She did not take kindly to the constant use of glasses, though she found them quite comfortable. As I would not promise her anything except from the constant use of the glasses, she discontinued the treatment.

This was not a case for tenotomy. Correction of as much of the error of refraction as she would tolerate reduced the muscular error for distance and reversed it for near. The lateral recti would have been benefited by exercise, and this would have been ordered had she continued under my care, though the symptoms were more properly those of accommodative than of muscular asthenopia.

Case II. Miss S., aet. 18, complained that in using her eyes for reading the types blurred in ten minutes. Her general health was very good.

Ophthalmoscope. Hyperopia.
Ophthalmometer. O. D. + 1.50 D 90°—180° with.
O. S. + 3.00 D 90°—180° with.

Muscles. At 20′, 10° esophoria.
at 14″, 3° esophoria.

Her manifest correction was + S 3.00 D, which left her with an esophoria of 4° at 20′.

Under Atropia—
O. D. $\frac{15}{cc}$ + S $5.00 = \frac{20}{20}$.
O. S. $\frac{15}{cc}$ + S $5.00 = \frac{20}{20}$.

With the accommodation relaxed there was still 4° es. at 20′.

After the mydriatic passed off she was ordered + S 2.50, which she has worn comfortably for some months. She now has no eye symptoms, an esophoria of 1° at 20′, and 1½° of exophoria at 14 .

Correction of the error of refraction in this case lessened the esophoria and dispelled the symptoms, as was to be expected. Her muscle balance now is what we all, I suppose, would consider normal.

Case III. Miss L., aet. 13, complained bitterly of accommodative asthenopia for a year before I saw her. She had almost constant headache and severe ocular pains on attempting to use the eyes. In consequence of this (and I do not believe I confuse cause and effect) she was in poor health, pale, and lacking in energy. There was no other special complaint except of the head and eyes.

Ophthalmoscope. Myopia.

Ophthalmometer. O. D. + 0.50 D 90°—180° with.
O. S. + 0.50 D 90°—180° with.

Muscles. At 20′, 24° esophoria.
at 14″, orthophoria.

O. D. $\frac{10}{cc}$ — S 5.00 = $\frac{20}{20}$ P.
O. S. $\frac{10}{cc}$ — S 5.50 = $\frac{20}{20}$ P.

This correction was ordered for distant use, and 3.00 D less for reading. Her ability to read comfortably and the subsequent history would exclude spasm of accommodation which the high esophoria suggested. In six months she returned, having laid aside the reading glasses and using the full correction for all distances, being perfectly comfortable, and seeing $\frac{20}{20}$. The esophoria was unchanged. She had no asthenopia, and was much improved in general health.

This is the only case in the series in which the refraction was not measured under a mydriatic, because the patient was from a distance and her time was very limited. The perfect comfort and full vision which came with the correction of the myopia is sufficient evidence that no further treatment was necessary.

Case IV. Mr. S., aet. 26, had worn glasses for twelve years for myopia, and was wearing — S 6.50 O. U. when I saw him. He had absolutely no asthenopia, and complained only of poor vision. He had two myopic brothers. General health good.

Ophthalmoscope. Myopia.

Ophthalmometer. O. D. No astigmatism.
O. S. + 1.50, 90°—180° against.

Muscles. At 20′, 2° left hyperphoria.
25° esophoria.

Correcting the hyperphoria reduces the esophoria to 19°.

Under Atropia—

O. D. $\frac{4}{cc}$ — S 13.00 D = $\frac{20}{50}$.

O. S. $\frac{4}{cc}$ — S 13.00 D $\subset\!\supset$ — cy. 1.00 ax. 90° $= \frac{20}{50}+$.

With the accommodation relaxed there was 4° hyperphoria, and 20° esophoria, which correction of the refraction did not modify.

He was given full correction for distance, and 2.00 D less for reading. I dismissed him with 2° left hyperphoria and 20° esophoria and no asthenopia.

It was interesting to see the lessening of the esophoria which followed correction of the vertical error, and Stevens has shown that the vertical error may be wholly responsible for the lateral one. Certainly there was no indication for correction of either error by operation.

An additional point of interest is the occurrence of such high esophoria associated with myopia.

I do not wish to be understood as taking these cases as a text from which to preach against the idea of muscular asthenopia; but with the growing tendency to conservatism in the operative treatment of muscular errors, cases like these are well to bear in mind to justify more moderate measures. Operation, in any of these cases, would have made the last end of that man worse than the first.

A CASE OF SARCOMA OF THE CHOROID.

By **B. F. TRAVIS, M.D.**, Chattanooga, Tenn.

On February 11th, 1896, W. M. H., of Summerset, Ky., consulted me with reference to his eye, which was giving him great pain at the time. He was an unmarried man aged forty-four years, and looked to be in moderately good health. His personal appearance was anything else than prepossessing, as he had lost the entire bridge of his nose which I shall refer to later in this paper. On investigating his family and personal history, I learned that his mother had died of a malignant tumor of the breast at the age of twenty-six years. His father died at the age of thirty years. The specific cause he did not know; however, he said his father had been afflicted with syphilis even before he was married. The patient himself had enjoyed good health until eight or ten years ago when he became afflicted with this eye, which gave him some pain and gradually produced the loss of vision. About two years after the eye-trouble began, his nose gave evidence of disease which resulted in its entire destruction, leaving it as flat as the palm of his hand. The nostrils were so nearly closed that it required the smallest probe to pass, causing him to breathe entirely through his mouth.

I will also mention that he had cleft palate which was congenital. On examining the eye I found the iris and ciliary bodies were very much congested, and the capsule of the lens presented a milky or chalky appearance, and also very much thickened. The lens not being clear an ophthalmoscopic examination could not be made, consequently I was in doubt as to the real nature of his trouble. In the absence of vision in this eye and the history of the case, I advised an enucleation to which he consented, and the following day was set for the operation. In the meantime I prescribed sulph. of Atropia, and hot water to be applied to the eye, and on the following morning I received a telephone message saying that my patient was so much relieved that he had declined an operation; but on the day following this he came to my office suffering as before, and asked that I operate. After the necessary antiseptic precautions, and the administration of chloroform I enucleated the eye, after which I made a thorough examination of the nerve and adjacent parts and found everything in a healthy condition. I dressed the wound by packing the orbit with iodoform gauze, and over this absorbent cotton held in place with roller bandage and allowed to remain forty-eight (48) hours, and on redressing it I found it almost healed without a particle of pus. He had no pain after the operation, and on the fourth day he left for his home in Kentucky, and I have not heard from him since. The eye was submitted to my friend Dr. W. C. Towns, of this city, for examination. We found upon opening the ball that the entire contents had undergone marked degeneration. The retina and larger portion of the choroid had been perfectly obliterated. The vitreous body was found converted into a thin black fluid densely filled with floating flakes. There was also a small tumor attached to and just behind the ciliary body, which Dr. Towns submitted to a microscopical examination and reported to me that it was a melenotic sarcoma of the choroid and ciliary body of the spindle cell variety.

Tumors of the choroid are of rare occurrence, but they challenge our attention because of their serious effects, both local and constitutional. Noyes says "85% are sarcomatous, and of these the pigmented are largely in excess of the white." As a rule we know nothing of the cause, and the eye is the primary seat of the disease. In a small number of cases, however, the origin of the growth is associated with an injury. In this particular case there was no history of an injury.

The history of the case and the condition of the interior of the eye makes it of importance. His nose no doubt was lost from having inherited syphilis from his father. There was also imperfect development of the upper jaw, cleft palate, etc. As soon as a diagnosis of sarcoma is made, enucleation at the earliest period is imperative. The optic nerve should be severed as near the apex of the orbit as possible. No form of tumor is so liable to be reproduced by metastasis as sarcoma, and while the liver is the most frequent place of deposit, the stomach, the lungs, and other tissues may be involved. Mitastasis occurs within periods varying from a few months to five years. Sarcoma develops as a rule after the age of forty years, and seldom ever occurs in early childhood, the period of glioma of the retina.

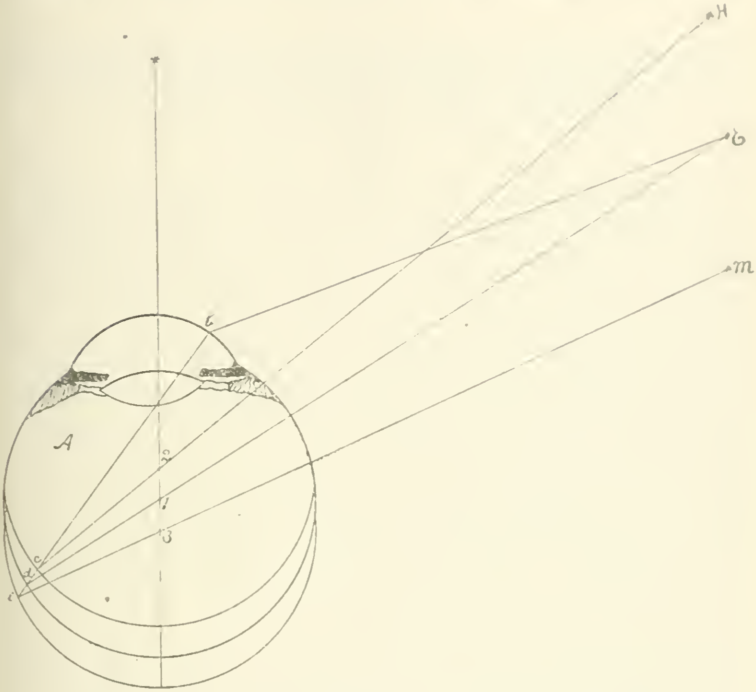
THE TRUE LAW OF PROJECTION.

By JAS. W. DUNN, M D., Nashville, Tenn.

As has been shown by Prof. Savage, the law of projection as announced by Helmholtz is incorrect, for, if it were true, the visual field of the temporal side would stop short at 65° instead of reaching to 90°, or more, as can be easily demonstrated by any one. After demolishing the theory of the latter, the former proceeds to state and prove his own theory, which is here given: "*Every object seen must be on a line vertical to that part of the retina receiving the impress of the light, regardless of the direction of the axial ray of light.*" Knowing that if this is the true law, which seems very plausible, while all objects situated directly in front of either the myope, emmetrope or hypermetrope would be correctly projected (i. e., would appear to the observer in their correct positions), all objects at the side would be misplaced except to the one whose eye was normal. I tested the law in several eyes, both normal and abnormal, in the following way: Each patient's accommodation being paralyzed by a mydriatic, he was placed with the side corresponding to the eye to be tested within two or three feet of a blackboard, and told to look directly ahead. A white dot about the size of a quarter was then made on the board, on a level with his head and at his side, but a little in front, so as to be seen easily as the patient looked straight forward. His eye away from the board being closed (his left eye, for example), a piece of chalk was placed in his right hand. As he looked directly ahead the white spot on the board was visible. He was then told to raise his hand quickly and make a mark on the board exactly where the spot appeared to be. Before he could see where he had marked, the line was erased and the trial again made. The direction of the line from the spot showed for a certainty the kind of ametropia, if any, I had to deal with. Thus, in hypermetropia of any appreciable amount, the line was in front of the dot; in myopia, behind, and in each case the distance of the one from the other was a rough measure of the error of refraction. In emmetropia the line ran through the dot, or just touched it in front or behind. Of course the measurements made by such a procedure as this would be very inaccurate, because of the fact that the patient cannot always make the mark where he aims, and is interesting only because of its tendency to prove Savage's theory of projection, and disprove that of Helmholtz. It is a quick and easy way, too, of determining the kind of refraction we have in an eye, for one needs no trial lenses to make the experiment, and I believe it will hold good where the accommodation is not suspended.

The reason for having the patient make the mark quickly is to have him make the mark where the spot *appears* to be. If he proceeds slowly, he will follow the motion of his hand with his eye and will correct any error he is making and, of course, put his chalk directly on the white spot. The mark he makes is erased immediately after being made, because, if he is allowed to see how he has missed, he will correct his error the next stroke. The accompanying diagram illustrates the position of the light as seen by the three kinds of eyes when the error of refraction is due to an axial defect.

Let A represent an eye that is emmetropic, hyperopic, or myopic as we wish to study it. We will take it in the normal condition first. A ray of light from the point E passes through the cornea at *b* and strikes the retina of the emmetropic eye at *d*. A line perpendicular to *d* passes through the center of retinal curvature which is 1; therefore, the line *d*1 is the line of projection for the point *d*. Produced, it strikes the source of light at E; therefore, the emmetropic eye sees the object exactly in its true position. Let us take the hyperopic eye next. The ray from E strikes the cornea at *b*, but is arrested by the hyperopic retina at *c*. Now, a line perpendicular to *c* passes through the



center of curvature at 2; therefore, the line of projection is *c* 2, which continued reaches the point H, and the light E appears at that point. Similarly the light of the myopic eye touches the retina at *e*, is projected through 3 to M, and the light appears behind its real position. These observations prove the law of Prof. Savage. It is easy to show that if the Helmholtz law were true, the nodal point remaining in the same position, these misplacements could not occur.

319 Highland Ave.

ACUTE GLAUCOMA; FIRST ATTACK CURED BY SULPHATE OF ESERINE; THE SECOND BY IRIDECTOMY.

By JAMES L. MINOR, M D., Memphis, Tenn.

While taking a bath on July 12th, '92, Mr. B. got some soap in his left eye. It caused intense pain in spite of all domestic remedies, and he came to me for relief within two hours after the accident. He was suffering severely with headache which seemed to radiate from the left eye, while that organ, was itself intensely painful—feeling, he said, as if it would burst. On examination, I found the eyeball much injected, the pupil enlarged, the iris pressed forward, the globe almost as hard as a marble, the sight nearly gone ($\frac{3}{200}$). The interior of the eye was so cloudy that no view of the fundus could be had with the ophthalmoscope. The case was clearly one of *Acute Glaucoma*, which would require an iridectomy, I thought. To get the eye in better shape for an operation, and to see how much good could be gotten from *Eserine*, I put one drop of a 1 % solution of the sulphate into the eye. In fifteen minutes the pain was less, and the injection of the globe was markedly diminished. A second drop was introduced, to be followed by further improvement. The drops were repeated every fifteen minutes, until they had been used six times. The pain was then entirely relieved; the eye looked as natural as its fellow, except that the pupil was reduced to a pin point. The tension of the globe was normal, and the sight nearly as good as ever $\frac{20}{50}$ [a high degree of hyperopia exists in each eye, and the vision in the good eye is only $\frac{20}{40}$, which he says is as good as it ever was].

The eserine was used once a day for a week, simply as a precaution, for there was no return of the disease. The sight was now as good as in the other eye, and the patient was dismissed with instructions to report in event of a return of the trouble.

Nothing occurred, however, for three months, when, on the night of October 10th, he awoke with intense pain in the left eye, severe headache, and most distressing nausea and vomiting. He attributed the trouble to a bilious attack, and thought the pain in the eye was incidental. I found, however, that he was suffering from another attack of glaucoma in the same eye, which was now blind, (V=Preception of light). Eserine was used without effect, and I sent the patient to St. Joseph's Hospital, where, with the assistance of Dr. W. W. Taylor, an iridectomy was performed, about ten hours after the outbreak of the disease. The pain in the eye, the headache, the nausea and the vomiting, which had been most distressing, continued up to the etherization for the operation. On recovery from the ether, he was free from all pain and discomfort. He slept the entire night, and has experienced no pain nor annoyance since. The eye made an excellent recovery from the operation, and he now sees as well as he ever did with it—$\frac{20}{40}$.

SYMPATHETIC IRITATION AND TEMPORARY BLINDNESS OF A FEW DAYS IN RIGHT EYE, AS A RESULT OF FOREIGN BODY IN LEFT EYE.

By J. T. HERRON, M.D., Jackson, Tenn.

L. K. age 14, came to me March 27, with the following history:

Last of December, 1895, while out hunting with a muzzle-loading gun, he attempted to remove an old cap. The hammer fell, and a small piece of cap $\frac{1}{16}$ inch square, entered center of cornea, passed through, and lodged in lens, producing total blindness. He states positively that he never detected light in the injured eye after penetration of cap.

He also states, and, is corroborated by his father, that about eight months after the injury he was almost totally blind for a few days in his good eye, to such an extent that he had to be led.

His family physician gave him only palliative treatment.

I found him having considerable pain in injured eye, photophobia, lachrymation, very tender over ciliary region, shallow anterior chamber, about $\frac{2}{3}$ of cornea opaque, so much so that I could not make ophthalmoscopic examination.

Had I seen this case immediately after the injury, I could have removed the foreign body and saved his ball, but owing to the history, and condition of eye, I advised removal. After enucleating the eye I was surprised to find foreign body in lens capsule.

The good eye has been all right since the temporary blindness passed away. I did nothing for this eye. I consider this case somewhat different from injuries we are generally called upon to treat. We get a history of complete blindness immediately after penetration of cap, also almost total blindness in good eye eight months after injury; the latter resulting in good vision without treatment.

I can understand that he could have made an error in regard to complete blindness immediately after the injury; but not to the good eye. What caused this temporary blindness, and why should it not have remained? I do not know, as I have never had a similar case, neither do I find one recorded. This case is doing nicely at present.

OPHTHALMIA NEONOTORUM IN UTERO, RESULTING IN ULCERATION, AND PERFORATION OF CORNEA OF RIGHT EYE BEFORE BIRTH.

I was called in with Dr. C., two weeks after the infant was born. I obtained this history as he attended mother during confinement. Soon after birth, he noticed an opaque spot in center of cornea, also perforation with considerable protrusion of iris. There was no pus; very little swelling of lids; almost all of symptoms had disappeared.

From the history, I made above diagnosis.

SUDDEN BLINDNESS WITH COMPLETE RECOVERY.

By B. F. TRAVIS, M.D., Chattanooga, Tenn.

On the morning of the 15th instant, I was called to see Mr. H. I., age 30, married man, a frescoer by profession. On my arrival I learned that he had suddenly gone blind while using his brush. His appearance indicated that his general health was good. He said he had suffered no pain whatever with his eyes or head, but was in total darkness. He stated, however, that vision in his left eye had been very poor, and had gradually grown worse during the past month, but his right eye was perfectly good up to the moment he went blind. I was inclined to think at the time that vision in the left eye had been entirely lost, even before this occurrence, and he not aware of it. I darkened his room, and with a strong light, I found that he had no perception of light, and an ophthalmoscopic examination was unsatisfactory as the pupil was small, though responsive to light. I instilled a drop of a 1 per cent. sol. of Sulph. of Atropia into each eye, and returned in two hours in company with my friend Dr. Savage, of Nashville (who was in our city at the time attending the State Medical Association). We made an ophthalmoscopic examination, and found a normal condition existed as to retina, but the vessels (veins and arteries) were too small.

The day following this the appearance was quite different. The retina presented a milky-white appearance, and the vessels possibly smaller. We put him on pilocarpin hypodermically at the onset of his blindness, and two days later I put him on Iodide of Potassium; however I don't think it had time to do much if any good, as about 2 A.M., on the 18th, I was called to see my patient in great haste.

I found that his vision began to return about one hour prior to the call, accompanied with a most excruciating pain in the eyes, of a deep-seated character. A hypodermic of morphia gave him relief, and he slept quietly until late in the morning. At 9.30 he presented himself at my office, and I was gratified to find his vision in right was $= \frac{20}{30}$ with scarcely any in the left. The vision gradually improved and his eyes felt stronger. On the 20th vision in the right eye was $= \frac{20}{20}$—and left $\frac{20}{100}$. To-day vision in the right is $= \frac{20}{20}$, and left $\frac{20}{100}$.

The retina and vessels show a normal condition, and he has had no pain at any time save this one attack which came on with the return of vision. This is an exceedingly interesting case to me, and the cause for it is equally perplexing, but I am inclined to the opinion that the obstruction to the circulation was to be found in the optic sheath. An acute inflammation possibly in the region of the limina cribrosa, causing a compression of the central vessels, and as a consequence a diminished flow of blood.

I will say in conclusion that the patient has always enjoyed good health, has never had syphilis, nor any trouble that would direct our attention to his recent attack.

[The smallness of the retinal arteries and veins, the milky whiteness of the retina, coming on in thirty hours, and the rapid and complete recovery, all lead me to believe that the condition was arterial spasm. Pressure at the nerve-head or in sheath would have given small arteries and large veins.—Ed.]

PARESIS OF ACCOMMODATION IN A YOUNG PATIENT FOLLOWING LA GRIPPE.

Reported by GEORGE H. PRICE, M.D.,
Professor of Physiology in Vanderbilt University Medical Department.

O. A. C. aet 18, came on April 9th, complaining of inability to do near work. A preliminary examination showed his condition as follows: 2° Esophoria in distance and 5° in near, 8° abduction, and 1½° sursum and deorsumduction, with probably compound hypermetropic astigmatism slight.

It was noted that his accommodation was defective, but in order to arrive at a positive result, homatropine was used and the following was recorded:

O. D. V. = $\frac{20}{20}$ w +. 50 ⊃ +. 25 cyl. ax. 180.
O. S. V. = $\frac{20}{20}$ w +. 50 ⊃ +. 50 cyl. ax. 160.

This shows good state of vision for distance, and the ophthalmoscope did not disclose anything unusual in the fundus. In a few days the patient was given his glasses and instructed to use them all the time, which he has done.

A brief history of this case may throw considerable light upon this condition.

When twelve years of age, while living in New Orleans, he suffered from an attack of la grippe, which lasted him several weeks. During this time his eyes were closed, and he was unable to open them. There was no discharge from them and there was no indication of any inflammatory condition, as the absence of discharge and irritation showed. His eyes remained closed for two weeks, and then the lids responded again to the will and he could again open his eyes, but only to be confronted with another annoying symptom, namely, double vision.

At the end of two weeks more the double vision disappeared, and now he found that though he could see in the distance he could not read.

His parents consulted a specialist in New Orleans, who concluded it was a case of shamming and ordered plane lenses as a placebo. He discovered this and never made use of them, nor did he return for further treatment. There was no improvement in his near vision, hence reading and going to school were practically abandoned. Later, a year or two since, while living in Mississippi, he was given a strong pair of lenses by a traveling spectacle vendor, which enabled him to read, but which gave him some distress about his eyes after using them, and further made him see many "floating specks." These he lost later, and as they caused him some disturbance, he has made no effort until now to have his condition improved by lenses. He can now only read or write a few words at a time, then stop and rest.

This is a most interesting case, and one which may and may not be relieved. From the history of the case, as given, one is naturally led to place the beginning of this trouble at the time of the attack of la grippe.

It seems from the symptoms detailed that there was at this time an involvement of those centers which control the motor oculi. There seems to be no question of the fact that at the time when the patient first noticed double vision, which was immediately after the superior levator had regained its strength, he was suffering from a condition of paresis of the int. rectus, with involvement of the superior and inferior recti as well, and also paralysis of the accommodation.

Such cases have come under observation of others before, but none of them, so far as I am able to discover, have suffered from a continued marked paresis of the accommodating muscle, though in some instances this muscle has been slow to take on its original function. The area of pathological change in this case was large enough to cause disturbance of all the nuclei associated with this complex center, and all have seemingly recovered from the condition which caused their suspension of function save that of the accommodation.

The prognosis of this case is uncertain, since the time which has elapsed has been sufficient to allow permanent changes to take place in the centre as well as the special nerve filaments involved. The treatment for the condition as at present found will be mechanical and medicinal. The former is by exercise of the ciliary muscles by means of concave spherical lenses, of .50 D., used once daily for ten minutes, while the latter will be along the line of alterative and tonic treatment. As to the expediency of electrical treatment I am in some doubt, though will give it a trial.

There is still another line of treatment which will be given a trial, which, for a better name, we will call a retrograde course of convex spherical lenses.

He can read at present with a + 1.50 D. for a time, but we will begin with a + 2.00 D., which will be lessened in ten days or two weeks to a + 1.50 D., and so on, as rapidly as may be deemed wise.

This will call into play the ciliary muscle, and thus encourage it to to take on active movements in accommodation.

If all these measures fail, then the patient will be treated as a man of sixty or more with accommodation entirely and permanently suspended, that is we will give him a permanent reading lens of + 2.50 to 3.00 D., for all near work.

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Canthotomy.

While doing this operation a few days ago it occurred to the writer that he might bring a flap of the conjunctiva between the lips of the incised skin without drawing on the ocular conjunctiva. To accomplish this purpose a puncture was made at the point of juncture of the upper and lower lids, between the skin and mucous membrane. One blade of a pair of scissors was inserted at this puncture beneath the skin, but not including any mucous membrane. The skin incision was then made in the usual way. One blade of the scissors was then inserted beneath the conjunctiva, pointing down and out and at angle of about 25° and the conjunctival cut was made as low as possible. The flap of conjunctiva thus procured was fastened to the upper edge of the skin cut by means of a single suture, while the lower margin of the cut was left to granulate. The result was all that could have been expected. The operation was much easier done than by the old method and the result better.

Jequirity in the Treatment of Trachoma.

It has long been known that certain cases of chronic granulated lids are best treated by means of a strong infusion of jequirity, or even by the use of the impalpable power of the bean. Recently we have had some experience with the treatment of old and rebellious cases of this kind by means of the long continued use of a very weak infusion of jequirity. Two of these cases had been treated by other methods, only temporary good following. Included among these other methods, was the use of a strong infusion of jequirity which gave temporary promise of cure. As a last resort, for these two cases, an infusion was made containing only one jequirity bean, ground to a fine powder, in a half ounce of sterilized water. Two drops of this infusion was placed in the conjunctival sac every morning for a week. A fresh solution was then made and the instillations were continued for another week. Thus the treatment was continued for five weeks, at the end of which time the stubborn ulceration of the cornea had healed, the pannus had disappeared and the lids had become smoothe. At no time was the reaction from the jequirity at all severe. Even a weaker infusion might have accomplished the same end.

It is well-known that some oculists express an unwillingness to ever use this drug, thinking it dangerous. Improperly made and injudiciously used, the stronger infusion might do much harm. The writer looks upon jequirity as one of the surest and best remedies that we have in the treatment of old trachoma. It may be that, in the near future, the more recent cases of trachoma will be treated with the weaker in fusions of jequirity and thus be rapidly cured. Those not using jequirity in suitable cases are minus a measure capable of accomplishing much.

Simple Rules for Detecting Paretic Ocular Muscles.

The symptom of which patients thus suffering complain is double vision in some definite part of the field. In determining which rectus muscle is affected there are two things to be determined: First, the part of the field in wnich the doubling occurs; Secondly, the eye which sees the furthest removed object. The affected muscle is always on that side of its eye towards which the doubling takes place, and it belongs to the eye that sees the furthest removed object. To illustrate: suppose that the patient has single vision immediately in front and to the right, but, on moving the candle in the horizontal plane to the left, doubling takes place. At once we are able to say that the affected muscle is either the external rectus of the left or the internal rectus of the right eye. Since the affected muscle belongs to the eye that sees the object furthest removed, it only remains for us to cover one eye or the other and learn from the patient which object disappears. On covering the right eye, if the object furthest removed is blotted out, then the affected muscle is the internal rectus of the right; if the contrary, then the paretic muscle is the exeternal rectus of the left.

If the doubling takes place in the vertical plane, single vision being below and immediately in front, but doubling taking place as the candle is raised above the horizontal plane, the affected muscle is the superior rectus of one eye or the other. It belongs to the eye that sees the higher object. If on covering the right eye the higher object disappears then it is the superior ot the right; if the contrary, it is the superior rectus of the left.

In cases of paralysis of a rectus muscle the diagnosis is made easy because of the squint that results. It is only in case of paresis that any difficulty in diagnosis arises.

Paralysis and paresis of an oblique muscle requires a more careful study, and yet it is comparatively easy to locate the affected muscle. If a candle be held vertically before such a pair of eyes there would be doubling, the vertical candle being seen by the non-affected eye while the leaning candle is seen by the eye to which is attached the affected muscle. If the left eye sees the leaning candle, and the inclination is towards the right, the affected muscle is the superior oblique of that eye. If it leans towards the left the affected muscle is the inferior oblique of that eye. The vertical meridian of the eye affected is always turned in the opposite direction to the leaning of the candle.

Upward and Inward Squint.

As is well-known, we often have eyes squinting up and in. As Stevens has shown, some of these cases can be cured by operating on the upper muscle only; rarely can they be cured by operating on the internus alone. It seems to the writer better to operate first on the offending superior rectus, and later on the internus. The method of operating on the superior rectus, as recently devised, and now practiced, by the writer, is to make a complete division of the middle and inner fibres, leaving the outer fibers uncut. This appears to be rational, since it must be the innermost fibres, in the main, that aid the internus in pulling the eye in. A cutting of the middle fibres alone would weaken the muscle as a whole, but the uncut inner fibers would still help the internus to turn the eye in.

Dr. Jas. P. Parker.

The founder and late editor of the *Annals of Ophthalmology and Otology*, is dead. He contracted pneumonia which resulted in his death, February 6, last. By request of his family no notice of this sad occurrence was published for several weeks, fearing that such a publication would result in temporary injury of the journal he had founded. Though not himself a writer, he had the tact of inducing others to write for the pages of the *Annals*. This power, coupled with fine business talent, made the *Annals* a power in the departments to which it was devoted. He will be missed.

As to the journal which he established, we are glad to be able to state that its publication will be continued without interruption, under the able editorship of Dr. Casey A. Wood, of Chicago, whose pen has already introduced him favorably to oculists in this and other countries.

Tennessee Special Edition of the Record.

As will be seen, this edition of the RECORD, is filled with matter furnished by oculists residing in Tennessee. All the contained papers and reports were gotten up on short notice, for it has been only a few weeks since we decided to adopt the *special edition* feature. Like charity, we thought this new journalistic feature should begin at home, hence the nature of this issue.

The next issue will be a general edition. The last issue of the current volume will be an Eastern Pennsylvania special edition. For this edition several papers have already been promised. Our Philadelphia *confreres* will see to it that the

Eastern Pennsylvania Special Edition will be full of good things, in spite of the warm days and nights of May and early June.

We propose, from now on, to alternate general and special editions, until the entire country has been gone over. In due time we hope to bring a London special edition.

The object of this venture is two-fold: first, to stimulate writers; second, to disseminate more of ophthalmology among the general profession. One thousand copies will be mailed to general practitioners in the state furnishing the matter for any special edition, as a compensation to the writers. In the next issue we hope to be able to name the third special edition.

New Special Journal.

No. 1, Vol. 1, of the *Journal of Eye, Ear, Throat and Nose Diseases*, is before us. It is edited by Dr. Francis M. Chisolm and Dr. John R. Winslow, and is published by the surgical staff of the Presbyterian Eye, Ear, Throat and Nose Charity Hospital of Baltimore. The initial number contains 34 pages rf reading matter, arranged in departments, through which we have gone with interest. It will be issued quarterly, and the subscription price is $1 per volume. We wish for it that degree of success which it will richly deserve.

The Western Society of Ophthalmologists, Otologistsand Laryngologists.

This new society was organized in Kansas City on April 9th, with a membership of seventy-five. Dr. Alt, of St. Louis, was elected president, and the following three were elected vice-presidents: Dr. B. F. Fryer, Kansas City; Dr. W. C. Pipeno, Des Moines, Ia.; Dr. J. W. Martendale, Minneapolis. Dr. Hal. Foster, Kansas City, was made secretary and Dr. W. L. Dayton was made treasurer.

A number of papers were read and discussed before the session adjourned on the 10th. At the end the new society was banqueted by Park, Davis & Co.

The next meeting will be held in St. Louis on April 10, 1897. There is a field for good work on the part of this organization in the West. The Record wishes for it the greatest usefulness.

DEPARTMENT OF
Otology, Laryngology and Rhinology.

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ACUTE MASTOIDITIS.

By N. C. STEELE, M.D., Chattanooga, Tenn.
Professor of Disease of the Ear, Throat and Nose, Chattanooga Medical College

Mastoiditis is an inflammation of the mastoid periosteum or of the mucous membrane lining the mastoid cells. The true bone-tissue may become involved in either condition. External mastoiditis, that is, inflammation of the mastoid periosteum, is secondary to inflammation of the mucous membrane of the drum cavity or to inflammation of the periosteum of the external auditory canal. In either case the inflammation travels along the periosteum of the canal and out around to the periosteum of the mastoid.

Internal mastoiditis is generally secondary to acute inflammation of the drum cavity. It may occur during an exacerbation of chronic disease of the drum cavity, but that is rare. In either case it is simply an extension of inflammation from the mucous membrane of the middle ear to that lining the mastoid cells, the mucous membrane lining both being continuous.

Of course in external mastoiditis there may result internal mastoiditis, and in internal mastoiditis there may result external mastoiditis, provided either persists long enough.

External Mastoiditis.

This form of mastoiditis is I think rare. In all forms of mastoiditis pain is the most constant and distressing symptom.

In this external form, distinct redness and swelling occur early. Therefore, when, in the course of an acute inflammation of the tympanum or canal, we have pain, redness and swelling behind the ear we, probably, have external mastoiditis.

Saline purgatives, leeches and hot fomentations, the latter early and persistently applied, often cut short the attack.

Should these measures fail to subdue the inflammation within twenty-four to forty-eight hours, Wilde's operation should be done.

Cut one-fourth to one-half inch back of, and parallel to, attachment of ear and from point of mastoid process upward from one to two inches, depending on age and size of patient. Cut to the bone the full length of the inscision. Do not be afraid: make a deep and long cut. The loss of blood and relief of tension usually promptly subdue the inflammation. Warm fomentations should be used after the operation for a few hours.

INTERNAL MASTOIDITIS.

This form of mastoiditis is secondary to inflammation of the drum cavity and is an extension of the inflammation along the mucous membrane which lines that cavity and the mastoid cells. Involvement of this lining membrane of the mastoid air cells may be of various degrees of extent and intensity. When in any case of acute or chronic middle-ear inflammation we have decided pain in the mastoid region, especially when there is distinct tenderness on firm pressure with but little or no redness or swelling, look out for trouble in the mastoid cells. In the earliest stage leeches and hot applications may check the disease.

Some have faith in a blister; but whatever you do let it be done at once and thoroughly. If a blister, use a large one early. If leeches, use from two to six, following them with hot, moist applications for hours. Should these measures fail after a trial of thirty-six hours, or if nothing of the sort has been done, and the tenderness is marked and the pain intense, and these symptoms have been increasing for several days, we should open the mastoid at once. Make the external cut like the one for external mastoiditis, only closer to the ear. Cut as near to the ear as possible.

Of course, should you find pus, on cutting down to the bone, you may not have to enter the bone. With a small stiff probe try to find any passage into the mastoid through which the pus may have come from the cells within. If none is found and the bone is sound you may rest there, using hot fomentations for a few hours or a day or two. Should you find no pus or find pus external to the bone but get no relief, then enter the bone. Do not hesitate, for there is scarcely any danger. Separate the lips of the wound as best you can or have an assistant do it, and go in. Remember never to enter the mastoid above the upper wall of the external auditory canal. Enter exactly behind or slightly below the center of that canal. You will thus miss the middle fossa of the brain cavity, and entering close to the ear you will miss the lateral sinus and can more easily enter the large cell, called the "antrum," which is just posterior to the tympanum.

If the bone is thin or softened by inflammation, a stiff probe can be used to enter the mastoid.

A carpenters large gimlet will do. Numerous paterns of drills and gouges are made for the purpose. I use Wilson's guarded drill. It can be set so as to enter any desired distance, and no further, without resetting. I usually enter from one-half to five-eighth inch at once. If pus is found in any quantity you need not go deeper.

It is well to push a probe in various directions searching for communications with other cells, especially with the antrum, the large cell located just behind the tympanic cavity and communicating with it.

I usually enlarge the surface end of the hole in the bone to three-eighths or five-eighths inch in diameter, with a hand gouge.

Small communications with other cells should be enlarged. Wash out with hot water and pack lightly with plain or medicated gauze which I allow to project between the lips of the scalp wound. Over the wound a vaselined cloth is laid and over this I place a piece of cotton. No bandage is needed. Strict cleanliness should be used throughout the whole course of treatment. Dress the wound daily, allowing it to heal from the bottom. Of course before operating you shave off any hair that is in the way. Bleeding is not usually troublesome. Use forceps, or pressure, to stop it if necessary. I have always used chloroform in these cases. I once hesitated to open the mastoid, but I do not now. I have opened it a number of times with most gratifying results.

Some late European surgeons do a more extensive operation, insisting on opening every mastoid cell, especially the antrum, that communication with the inflamed tympanic cavity may be established.

I have not found this necessary in my cases. When I cut or drill for pus and find it I think that is enough. I have no doubt that the more extensive operation is sometimes indicated, particularly when pus is not found without it, and especially in chronic mastoiditis, or mastoiditis in the course of chronic middle-ear disease.

THE

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THE INDICATIONS FOR OPERATING IN INSUFFICIENCY OF THE OCULAR MUSCLES.

By PROF. FRANCIS VALK, M.D.

Professor of Diseases of the Eye, N. Y. Post Graduate School and Hospital.

It has always occurred to me that it was difficult to decide when it is best to operate on the ocular muscles for insufficiency; and what would be the best operation to perform. With this object in mind, I think that the presentation of my own views on this subject may be of benefit to some members of the society; while on the other hand, a free discussion among yourselves may be of service to me.

Let me first state that I think the decision as to the necessity for an operation is a very important feature; and secondly, the determination of *what* operation to perform is decidedly much more important. I do not believe or contend that all our indications point to any one operation, but that they must be modified or elaborated according to the results given to us by the tests of the relative power of the straight muscles of the eye. You will notice I speak of the straight muscles of the eye referring to those, which at their attachments at the apex of the obit pass directly to the eyeball; and in no way shall I concern myself with the oblique muscles, for the reason that I cannot believe that these muscles have any action or influence in turning the eyeball on its center of rotation, but that the functions of these oblique muscles are simply and solely to keep the vertical plane of each eye parallel to that of its fellow-eye.

If we then return to my first proposition, as to the necessity of an operation on these straight muscles, we have two conditions which present themselves to my mind, namely: is there a want of balance in the relative power of the antagonistic muscles; and secondly, can the patient be relieved by any other means than an operation? To answer these questions we have first to determine what is the balance of power in these muscles. This is a very interesting subject, which on November 19, 1893, I endeavored to prove by reading a paper before the Ophthalmic Section of the Acad. of Med. on the "Dynamics or Power of the Interni," in which I strove to demonstrate that the normal position of the eyes was one in which both eyes will be directed straight forward to a point 15° below the horizon, forming with the optic axes an angle about fifteen feet in front. The base of the triangle, so formed, extending from the center of rotation in one eye to that of the other. In this position I consider them in a state of rest, even though it may be stated that the eyes will and do assume other positions under the influence of sleep, death or ether narcosis. This has been well stated by Schweigger in a criticism of another subject, "that death and ether narcosis are not natural conditions."

Placing the eyeballs in this position of rest we will find that they may be moved in any possible direction by either the single or combined action of the straight muscles; that they can be converged by the action of the interni; that they can only be made to diverge by artificial means, and that the uses and purposes of daily life require the eyeballs to turn downward much more than upward. The above being the natural action of these straight muscles we can readily understand that, though they can be antagonistic to each other, yet the requirements of daily life and work are such, that one set of muscles must consequently be stronger than the other. At the same time the eyeballs will be held in their proper position by that exquisite retinal function, guiding sensation or fusion power, which alone pertains to the eye, and by which action direct rays of light from an object may fall upon the macula lutea of each eye. Then if it is necessary that one set of muscles should be stronger than the other, and furthermore considering the necessities of sight, near and far, we can see that the preponderance of power must exist in the interni; then we should find the next in power to be the externi; then the inferior, and lastly, the superior, according to the relative need of action by these respective muscles.

Now what is the power or dynamics of these straight muscles? And how shall we determine that condition? Knowing the existence of this guiding sensation and the effort nature will make to avoid double vision, we find that if we deviate the rays of light from a bright object so that they will fall upon other parts of the retinal field, then the eye will, in an effort to again focus the rays upon the macula, unconsciously turn on its center of rotation. The power to deviate those rays to the greatest distance, at which they can be fused into an image, will represent the power of the individual muscles to turn the eye in that direction. Then if we use a prism to deviate these rays, the power of the prism must represent the power of this muscle. In other words the angle formed by the deviation of the rays by a prism will be the power of the muscles to turn the eyeball on its center of rotation and direct the visual line towards the object.

Many tests have been suggested to demonstrate insufficiency of the straight muscles; of these I will mention only two, that of the old Graefe Vertical Diplopia test, and the more modern one, Maddox Rod test. The great objection I have to these methods is, that they take from the eyes their most important function, the power to fuse images which fall upon different parts of the retinæ, consequently placing the normal function of the eye in a false position; while on the other hand if we use the old, yet well tried and proved, prism test, we still have the advantage of the guiding sensation, and with the eyes in the normal condition are able to test the balance of power. I have always held these views in reference to testing the ocular muscles, and if we refer to Stevens on Functional Nervous Diseases, page 198, he says in specifying the tests for insufficiency: "All these determinations having been made with sufficient care, the examiner proceeds to ascertain the relative power of the different pairs of muscles by finding the strongest prism with which images can be united in different directions." Hence it is very evident that the author, although he has given us different instruments to test these muscles, yet, at the last moment, he must come back to the prism test, letting that decide the relative power of the muscles and the necessity of any interference. Again the question has been raised, and I am very sorry to say often quoted, that the prism test will not give us the true power of the muscles because while testing one eye there will be a corresponding action of the muscles of the other eye; as if while testing one internus with the prism that the externus of the other eye will contract at the same time to overcome the stimulation of the interni of the same eye, etc. I have time and time again in my office practice with the assistance of an intelligent patient, proved the fallacy of this idea. I proceed in the following manner by placing the prisms with the base outward over one eye until I produce double images of the light; I then place Snellen's test card behind the candle and have them read the letters for me as seen by each eye; and I find that the image seen by the uncovered eye will be clear and equal to $\frac{20}{15}$, showing that the image must be formed at the macula, for the slightest deviation of the eye will at once reduce the visual power. While the image seen by the prism covered eye will be very much reduced, for now the image is formed on the peripherial parts of the retina, removed from the point of most distinct vision. We have no evidence of any innervation of the muscles of the other eye, each eye is independent according to the stimulatian of the fusing power, and we cannot prove otherwise. You will now understand that I make my tests for the relative power of these straight muscles by placing prisms with the bases first inward, then outward, upward, and lastly downward, recording the tested muscles. This process is continued by employing stronger prisms each time so long as the eyes will continue to fuse the image of the candle, and the strongest prism that can be used after several trials, will decide or indicate the muscular power to turn the eyeball in a certain direction.

Now, in reference to the manner of employing this test: we first ascertain the power of the externi, for I consider the abductory power of this muscle to be as a rule constant. We next test the interni, and here we should proceed very carefully, as now we have a muscle that will respond to our test; and by repeated trials we may find an increase in power, so we should continue the trial on alternate days until there is no improvement. Some will rapidly respond while others will remain the same as at first. Recording these results we then proceed to find the power of the inferior, and lastly, the superior. What should be the result of this examination? Again referring to my aforesaid paper, we should find a certain proportionate balance, as follows: First, in reference to the lateral moving muscles, if we take the power of the externi as one, then we should find that of the interni to be two or three times stronger, or as one is to two or three. As for example, if the externi can overcome the deviation of a prism of 6°, then the interni should overcome one of 12 to 20°; likewise in testing for the power to move the eye up and down, we should find the inferior stronger than the superior. I am convinced that it makes no difference what may be the power of any individual muscle, provided we find the above mentioned proportion; namely, the interni, stronger than the externi, and the inferior than the superior.

I can hardly agree with Stevens that the externi must overcome a prism of 8° to be of normal power, as that would compel the interni to overcome a prism of 30°. I do not think that it is important what may be the abducting power provided the adducting shall be found to be much greater. I make it a rule to test the lateral moving muscles in all my cases, and have yet to record a case where I have found the power of these muscles anywhere near that suggested by Stevens. I frequently find the externi as high as 8°, sometimes 15°, but the interni seldom go above 30°.

I will now state the operative procedures, which I have up to the present time found most useful; and then consider the indications for the selection of the method and how to operate. I must acknowledge, however, that I am not at all familiar with the operation called graduated tenotomies as suggested by Stevens, but as I understand the term it seems to me, that by graduated tenotomies we must operate too often; while in my cases I can only recall one in which I had to operate four times, and each one was in a certain sense a radical operation. I prefer to make my operations at once as extensive as I think the case will permit; thus I have found out that I can as follows divide my operations into three distinct methods.

First.—Partial tenotomy, in which with a small opening in the conjunctiva, and with a small hook, I expose the tendon of the muscle to be operated upon, then with a small pair of scissors I cut the tendon close to its attachments to the eyeball, but being very careful to leave uncut a very small central portion the size of a large thread. The conjunctiva is then smoothed over the wound without a suture; I then simply apply a cold water dressing, and at no time cover the eye with a bandage as I prefer the eye to be used.

Secondly.—If we decide that a partial tenotomy will not give us sufficient effect, that is in a case of decided insufficiency, then by means of the second method and with the same preliminaries as before, I do a complete tenotomy, severing all the fibres of the tendon, and continue as in the first.

I now come to my third method, an operation which is original in myself; although after I had used this method a number of times I was informed that Savage, of Nashville, Tenn., had adopted a similar method for shortening the muscles of the eye, but I believe that I have improved upon Savage's method. In this operation when the muscle is innervated by the stimulation of the guiding sensation, the object is to shorten the muscle and have increased power in order to turn the eye. Having decided upon the muscle to be shortened, I make a horizontal incision in the conjunctiva over the muscle; and I then fully expose the tendon and muscular fibres by passing two strabismus hooks beneath and separating them as far as needed. Now taking a small curved needle armed with No. 00 cat gut suture, I pass it beneath the tendon close to its insertion to the sclera and bring it out above. The needle is again inserted from within outward as far back as I decide to form my *tuck* in the muscle. We now carry the suture across the belly of the muscle and at a point opposite the previous insertion; I pass the needle from without inward, coming out below. Going back now to the tendon, again very close to the sclera, the needle is passed under the tendon, brought outward opposite the first insertion and the needle is cut off. We now have the suture in a position ready to tie. Making a surgeon's knot in the suture we slowly and cautiously tighten it, so as not to break it, and we will at once see the small knuckle formed in the muscle. We then tighten this according to the effect desired, fasten it with another knot, cut the suture off and smoothing the conjunctiva over the wound completes the operation. I leave the suture in the eye allowing it to be absorbed as the tissues unite. The small knuckle, so prominent at first, will slowly disappear and no trace of the operation will remain.

You will note that by this method of passing the suture, also by the use of catgut, I have materially modified Savage's method, and I am inclined to think from my results that we have an operation decidedly useful, and one that practically requires no after treatment. I simply apply cold water for one or two days and allow them to use the eyes the same as before. Occasionally we will notice a slight œdema of the conjunctiva about the cornea, but that soon passes away under the use of boracic acid wash.

I will now pass to a few illustrative cases that have shown the indications for these operations, and in which I think the three operations, as suggested, have been of practical service. You will perceive that in all these cases glasses have been given, after the most careful objective and subjective examinations, but without relief. I would also state, that in all my cases in private practice, I test the power of all the straight muscles, and in a large number I perhaps find some indications for an operation; yet they have been relieved by the use of their glasses, and consequently here the operation was not required. It is in those cases in which glasses have failed to give the desired relief, that I have tested the muscles several times and operated according to the indications given by the tests.

Miss M. C., age 68, sent to me by Dr. Barton. Had graduated tenotomies performed on her some years ago, but without relief. Headaches, frontal, extending backward with pain in the eyes. Refractive condition shows hyperopia with hyperopic astigmatism against the rule in the right eye. Glasses did not relieve her. Adduction 10°, abduction 1°. Tried prisms with bases outward, but they did not improve her condition. January 1896, I did a partial tenotomy of left internus. One month after adduction 10°, abduction 8°. In this case you will note that the indications are to reduce the power of the interni, and so increase that of the externi; and the last trial by prisms shows a very good balance with both muscles weak.

Miss V. P., age 30. Eyes pain—cannot read—conjunctival congestion. V. $\frac{20}{15}$ slight hyperopic astigmatism; not relieved by glasses or prisms. Adduction 12°, abduction 10°. March 1895, did partial tenotomy on right externus. October, 1895, has been well all summer, no irritation about the eyes. Adduction 25°, abduction 5°. You will observe that this case is just the reverse of the preceding one, as here we have a condition of exophoria with relief from partial cutting of the tendon.

Another interesting case is that of Dr. A. J. M., of the class of 1894, at this school. He had headaches, pain in the eyes, very nervous, and says when he looks straight ahead the pain goes down his back to his knees, and is worse when reading. I found he was wearing compound hyperopic glasses with 2° prisms, base in, for distance, and 5° prisms, base in, for reading. On examination I found no astigmatism, but slight manifest hyperopia. Adduction 1°, abduction 15°. December 1894, I cut the left externus and interni increased to 6°, and one week after I did the same operation on the right externus, and now found adduction 10° with complete relief. He only needs glasses for reading. In this case you will note that the indications were very clear that we should reduce the power of the abductors, and had he not improved we could have increased the power of adduction by use of the cat cut suture.

Miss M. E. M., age 24. Headaches all the time and pain over the eyes. She has compound myopic astigmatism, feels better with glasses but pain in head over the temples and backwards towards the occiput continues. Adduction R 5° L 2°, abduction R 10° L 8°. April '95 I did a partial tenotomy on left externus and in June '95 did a complete tenotomy of right externus with complete relief.

In this case the indications show that the power of the externi are too strong hence I did a partial and then a complete tenotomy, in this way weakening the abduction and increasing the adduction.

Mrs. W. M. H., age 30. Constant headache, extending backward, cannot read. Has compound myopic astigmatism. V corrected with glasses $\frac{20}{15}$, confirmed by all the objective tests; but no relief. Adduction 10°, abduction 12°. In this case we find the power of abduction too great and the indications point to tenotomy; and again I do a partial tenotomy on the left eye followed a month later by a complete tenotomy. Results were relief to all pain and adduction 12° abduction 5°.

Mr. C. J. F., Wichita, Kansas. Age thirty-two, came to me November 5, 1895. Asthenopia past three years, eyes feel tired, pain in and around the eyes, cannot read half an hour, if so has drawing sensation about eyes and pain in back of neck, is neurasthenic and unable to work. He has traveled for the past few years and consulted several oculists, who have correctly fitted him with glasses but with no relief. Has not attended to his business for more than a year.

R. E. V.$=\frac{20}{50}$ w $+.50 \subset -1.50^{c}$ ax $165^{\circ}=\frac{20}{20}$.

L. E. V.$=\frac{20}{40}$—w— $.75^{c}$ ax $180^{\circ}=\frac{20}{20}$.

This condition was confirmed by the objective examination, Javals Ophthalmometer, Retinoscope and the Ophthalmoscope. He was wearing these glasses and as they were correct I then examined the muscle balance and after repeated efforts I found exophoria of 4° with abduction 10° and adduction 8° to 15°, constantly changing with less power for adduction in the right internus. Here we have a case in which it is evident that the power of abduction is about correct, but there is a fault in the adduction; hence I at once decided to shorten the internus. Selecting the right eye, I inserted the catgut suture, as previously described, using a 4% solution of cocaine. You will note the result for, on November 15, ten days after, I again carefully examined his eyes with prisms and found that each internus could overcome a prism of 30° and each externus one of 8°. He expressed himself as feeling much better and I have a letter from him, dated two months after, stating that he was back at work and that he could use the eyes for any length of time, his nervous symptoms had passed away with no asthenopia. This case fully illustrates the indications and use of the catgut suture, an operation easy to perform and with none of the difficulties of on advancement.

Mrs. C. H., age 49. Constant headache, is wearing convex cylinders, correcting her refractive condition but pain is not relieved. Adduction 5°, abduction 6°, left internus weaker than right. December '95, catgut suture in left internus. Reports much better and now we have adduction 12°, abduction 6°. Glasses continued.

In these cases you will observe, that the muscles at fault were very weak while the opposing muscles seemed to be correct; so the indications were simply to increase the power of the weaker by shortening the interni, in which we succeeded by the use of the catgut suture in restoring a normal balance.

To conclude, what then are the indications for an operation on the straight muscles of the eye? First, a want of that normal balance of power, a power that will be controlled by the guiding sensation of the retina and one in which we must find the power of the interni to be much greater than that of the externi; and when these indications are fulfilled I do not believe that we will have any muscles asthenopic. On the other hand if this normal balance does not exist we will then make a constant effort of the muscles to adjust the position of the eye so that we may, by the stimulation of the guiding sensation, have binocular vision. Now test the muscles by the use of prisms; and if we find the power of adduction too great, then we may do a partial or a complete tenotomy; but should the power of abduction be about correct and that of adduction very low, then our indications point to a shortening of the weak muscles in which I have found the single catgut suture to be of great service to me.

Since the above paper was read before the Clinical Society I have had Mr. E. B. Meyrowitz of this city, make for me an instrument that I call *Twin Strabismus Hooks*, for holding the muscle to be shortened after it has been exposed in the usual manner. This instrument has a spring in the center, and is closed, then passed beneath the muscle and allowed to open. In this position we can readily pass the catgut suture and then remove the hooks. By the use of this instrument we do not require or need an assistant.

146 East 37th St., New York.

PRACTICAL POINTS IN TAKING THE FIELD OF VISION.

By EDWARD JACKSON, A.M., M.D., Denver, Colo.
Professor of Diseases of the Eye in the Philadelphia Polyclinic; Surgeon to Wills Eye Hospital Philadelphia; Special Lecturer on Physiological Optics in the University of Colorado.

The knowledge of the extent and form of the field of vision renders valuable aid in diagnosis; yet one must not attach too much importance to a single observation, or to a particular map of the field of vision. We find in the books certain limits assigned as normal for the various color fields; but under different condition of illumination these limits vary widely. Charpentier has demonstrated that under an intense illumination these limits extend well out to the periphery of the field for white, the field even for green extending much beyond the limits commonly assigned as normal for the field for blue.

The field obtained in any given case depends much on the illumination and size of the test object. With a test object of one size I have found a typical hemianopsia. With a large test object the defect in the field has been confined to a much smaller sector. This matter is of especial importance for it is very often the case that the concentric narrowing of the field of vision, especially of color vision, is not an absolute cutting off of any portion of the field, but rather a dulling of sensibility in that part of the field so that, with a larger test object, no narrowing of the field would be observed. On the other hand the employment of a smaller test object will sometimes show alterations of the field which would otherwise remain unnoticed.

In taking the fields in every day practice I most frequently resort to the method where the surgeon faces the patient who fixes on the surgeon's eye while the surgeon's fingers are the test object or carry it. This, of course, judges the patient's field by comparison with one's own. It requires that fingers, or other test object, should be moved in a plane where they will be equally distant from the eyes of surgeon and patient, except in testing the lower-outer field for form, where the hand must be carried toward the patient, even to the plane of the patient's face. This test has the advantage of allowing the surgeon to watch closely that the patient's eye does not wander out toward the test object. Again, by sometimes moving the fingers, and sometimes holding them still, and requiring the patient to tell when they are moving and when still, the test is given the force of an objective test. The result does not rest on the patient's unsupported statement that he sees, or does not see, the object. It is, too, an excellent test for the purpose of training the patient for the use of the perimeter; and for estimating the probable accuracy of the statements he will make during perimetric observations. In a large proportion of cases it is the only test of the field of vision that is required; but in cases where a map of the field by the perimeter, is also wanted, the testing by the hand is not lost time.

In testing the color fields by this method, I take several different colors in the hand not used for the test, and pick one from these with the test hand, and without looking at it carry it to the extreme periphery of the field, and then gradually approach it to the visual axis until the color is recognized and named. This also has the value of an objective test. In this comparing of the patient's visual field with that of the surgeon it is important that the latter shall not be given an advantage by previously knowing what color it is that is advancing upon the periphery of the field.

In testing for a central color scotoma it is important that the patient be not given a chance to recognize the color tried by exposing it in some part of the field outside of the scotoma. This is to be provided against by taking a large sheet of paper with a hole of the proper size near the centre, having the patient keep his eye steadily fixed on this hole, and having several colors concealed beneath the paper, exposing one after another, and requiring the patient to name the color so exposed.

In the case of a patient recently seen who was unable to name colors on account of aphasia, I held colored wools near the centre of his field of vision; and had him point out the one corresponding to the color of the test object in the periphery of his field, so soon as this had advanced far enough toward the centre of the field to be recognized. Something of the same method might be applied, though not so readily in testing for central color-scotoma.

Where vision at the fixation point has been lost or so impaired that fixation is uncertain or impossible, the ordinary plan of fixation is useless. For central scotoma, I have found it most satisfactory to have a series of concentric circles on a piece of paper, each successive circle having a radius say one centimetre greater than the circle next within it. The patient is told to look at the centre of these circles which are held at such a distance that the image of the outer circle falls beyond the region of the scotoma so that the circumference of this circle is clearly perceived throughout. Should the scotoma be exactly circular one ring will be visible beyond it, and the next smaller ring will be invisible within it. When the scotoma is oval with the long axis horizontal, some of the circles will be seen above and below although the lateral portions are hidden. With the aid of this arrangement fair fixation can be obtained and a scotoma satisfactorily mapped, although it involves the fixation point.

In studying the visual field I find each modification of method has some superiority in a certain class of cases. A general search of the field for all kinds of defects is best made with the hand for gross defects, or with the perimeter for more minute breaks in the field. When, however, a scotoma has been discovered, and it is desired to exactly map it, the blackboard is more convenient for the purpose; and the patient's distance from it should be adjusted to the size of the map desired.

In measuring concentric or approximately concentric contraction of the field, the arm of the perimeter should be fixed at a certain meridian and the test object moved along it. In studying a hemianopsia or a sector defect of the field, the test object should be fixed at a certain point on the arm of the permeter; and the arm revolved so that the test object shall describe a circle about the fixation point. The determination is most accurate when the movement of the test object is perpendicular to the line bounding the field of vision. The facility with which the test object may be moved in every direction, and so may fix all the boundaries of the scotoma with equal accuracy is the advantage of the black-board in mapping a scotoma. For ring scotoma one should use the perimeter as for concentric contraction.

In recording fields it is very convenient to place the records of the fields for form and color, taken at any one time, all on the same chart. The field for form may be recorded in black; and those for colors each in its appropriate color by colored pencils. In reporting a case of concentric contraction where it is desired to save the cost of reproducing a chart, the suggestion of Priestly Smith (*Ophthalmic Review*, Vol. IV. p. 266) for grouping the numbers, representing the extent of the fields in different meridians, around the letter indicating which eye as a centre, is quite useful. Thus:

55 55 70
55 R. 90
58 65 80

indicates slight contraction of the field, giving the extent of the right eye in eight directions from the centre.

SOME PUPILLARY PHENOMENA, NORMAL AND PATHOLOGICAL.*

By E. E. HAMILTON, M.D., Wichita, Kansas.

For practical purposes the visual, like the auditory apparatus may properly be divided into two portions, the conductive and perceptive, the retina being the dividing line where the former ends and the latter begins. In other words the retina may be regarded as the terminal organ of vision proper, while all structures anterior to it are conductive and refractive arrangements for securing an accurate focusing of light so a distinct image of objects may be formed on the retina.

Contributing not a little to this result is the pupil, a round opening in the iris situated a little to the nasal side of its center. Oscillating on either side of a mean diameter of about five millimeters, thus involuntarily accommodating itself to different degrees of light, this little space measures the diameter of every pencil or ray of light from every luminous point that reaches the retina.

To sufficiently understand some pupillary phenomena, manifested in health and disease, we must know something not only of the pupil itself and its immediate relations, its dilating and contracting mechanism; but of the innervating apparatus concerned in the act of vision as well.

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*Read before Kansas State Medical Society, at Topeka, May 14, 1896.

This is true for the reason that while the size and movements of the pupil in health have much to do with distinct vision, conversely loss of vision from lesions affecting the nerve supply of the eye, in turn have much to do with the size and movements of the pupil.

The pupil is in immediate relation to the lens, the pupillary edge of the iris lying gently in contact with its anterior capsule. It marks the boundary between the anterior and posterior chambers, both of which are occupied by the aqueous humor.

It contributes largely toward the circulation and maintenance of the normal tension of the eye. The aqueous humor secreted largely by the ciliary body, first reaches the posterior and then the anterior chamber through the pupil, finally leaving the eye through Schlemm's canal and the anterior ciliary veins.

The size of the pupil is mechanically affected in two ways:

(1) By the tension of the eye, any increase causing its dilatation, while the pupil contracts when the tension is lowered.

(2) By the condition of the iritic blood vessels any distension of which broadens the iris and contracts the pupil, while an opposite condition of its vessels allows it to be narrowed with consequent dilatation of the pupil. The pupillary contraction in association with accommodation is, in part at least, a mechanical process, the contraction of the ciliary muscle forcing the blood into the iris causing the pupil to become smaller.

The above two causes seldom operate singly to produce the pupillary results mentioned, their action being more or less associated and inter-dependent.

Other movements of the pupil depend entirely on its innervating mechanism. Here there are two opposing forces, contraction and dilation, each supplied by separate and distinct nerves.

Taking up first the movements in contraction, we find there is a reflex, involuntary movement; and an associated movement, in part at least under the control of the will, both brought about through the agency of the optic and motor oculi nerves.

As the optic nerve is the afferent channel for pupillary contraction, as well as the special nerve of the sense of sight, it naturally first attracts our notice.

The retina is regarded as a detached portion of the brain, containing cells capable of generating nerve force. The optic nerve is made up in part of fibres from these retinal cells, and in part of fibres from the primary optic ganglia, and is therefore capable of conducting impressions in opposite directions.

From the retina the optic nerve extends backwards to the chiasm, where there is a partial decussation to form the right and left optic tracts, fibres from the right or temporal half of right retina uniting with fibres from right or nasal half of left retina to form the right tract, and vice versa.

The connection of the visual portion of the optic tracts with the brain is through the medium of three ganglia, known as the primary optic ganglia. They are the anterior corpora quadrigemina, the optic thalamus and the external geniculate body.

From these ganglia, collected fibres radiate and extend backwards under the name of Gratiolet's optic radiation to portions of the cortex of the occipital lobe, known as the visual sphere.

From here, it is presumed, associating fibres extend still further, uniting this region with the cortex of the parietal, temporal and frontal lobes of the same side.

Retinal light impressions are conducted through the optic nerves to the chiasm where they are divided so that each tractus transmits impressions from both retinae. The primary optic ganglia collect these impressions and transmit them to the occipital cortex. Here the object, light from which entered the eye through the pupil to the retina, is first seen and recognized by the consciousness.

Down in this region somewhere, among these ganglionic cells, is the location of the optical memory pictures, which the mind so often recalls. We are here treading on slippery ground. It will become us to reverently make our bow and retrace our steps hoping to find, "Some domain more of the knowable."

Either after or just before entering the primary optic ganglia, part of the tractus fibres diverge destined for the nucleus of the oculo-motor nerve on the floor of the fourth ventricle to regulate the movements of some of the ocular muscles and the reflex light reaction of the pupil.

Probably each muscle supplied by the third nerve has its own group of ganglionic cells, those for the ciliary, sphincter pupillæ and internal rectus muscles lying in close relation in the anterior part of the nucleus.

There is some evidence going to show that there is a separate center subserving pupillary light reflex, apart from the center for contraction of the pupil in association with accommodation and convergence. If this be true, probably the tractus fibres going to the nucleus of the third nerve furnish the channel for reflex, unconscious pupillary light contraction under light impressions, but has little to do with the movements of the pupil in association with accommodation.

The efferent channel both for reflex and associated pupillary contraction, is through the third nerve to the ciliary ganglion, and from this through the short ciliary nerves to the sphincter of the pupil, and thus the reflex arc starting at the retina and ending at the pupil is complete.

The dilating mechanism of the pupil is under the control of the cervical sympathetic nerve. Filaments from this nerve take their origin from the cilio-spinal center located in the lower cervical and upper dorsal region of the spinal cord. Here they leave the cord and communicate with the sympathetic in the neck, and from thence with the cavernous plexus and ciliary ganglion and short ciliary nerves, they reach the iris.

The pupil, of course, dilates in the absence of light and retinal stimulation. It dilates when the sensitive nerves of any part of the surface of the body are irritated as well as under mental emotions, such as fright or anger. In the absence of these sensory and psychic stimuli, as in deep sleep, the pupil contracts, dilating again on waking.

The pupil is larger in youth and early adult life than in old age. These conditions are so constant that any deviation, such as enlarged pupils of old age or contracted pupils of youth, suggest pathological changes.

The pupil is smaller in hypermetropic than in myopic refraction. It dilates in deep inspiration and contracts in expiration, from purely mechanical causes. These are common phenomena, for the most part compatible with perfect health.

In considering those due to disease, the iris itself will not be considered, the condition of the pupil being taken as an index of pathological changes elsewhere.

As a rule all losses of visual acuity due to lesions in the perceptive part of the visual organs, from the retina to the highest visual center in the cortex of the cerebrum, are attended with equality of the pupils. This presupposes a healthy condition of the structures anterior to the retina. This equality of size is accounted for by the fact that fibres from each retina go to both visual centers, and therefore light falling on the retina of one or both eyes, whether healthy or diseased, produces an equal effect on the pupils.

Lesions of the retina or optic nerve may produce blindness in the corresponding eye, in which case light falling on the eye produces no pupillary effect if the fellow eye be excluded. Light falling on the healthy eye produces contraction of both pupils the same as when both eyes are healthy.

Lesions on the right side back of the chiasm, whether in the tractus or in the visual sphere of the occipital cortex, produces blindness of the right half of each retina, a condition known as left homonymous hemianopsia.

Here the reaction of the pupil to light will differ according to the location of the disease.

If the reflex arc is intact, as it is in central troubles, pupillary movements will be normal even though there be complete blindness from bilateral trouble, and no opthalmoscopic changes are visible.

If the reflex arc is interrupted unilaterally in the afferent channel, the pupil fails to respond when light strikes the blind half cf the retina (hemianopic pupillary rigidity) but responds when it reaches the half still functionating.

If the reflex arc is interrupted bilaterally, and in the afferent channel before tractus fibres divide, there is complete blindness, widely dilated pupils and no response to light.

If the interruption is in both channels, between the division of the tractus fibres and the pupil, vision is not affected; but pupillary light response is abolished.

A transverse lesion of the chiasm would produce blindness in both eyes, with absence of pupillary light response. Binasal hemianopsia can only occur from a vertical lesion, while bi-temporal hemianopsia from a symmetrical lesion on each side of the chiasm. Here we get pupillary light movements, only from parts of the retina that are still performing their functions.

Centripetal pupillary disorders, though attended with loss of visual acuity and light reaction, the pupil still reacts to sensory and psychic stimuli, and during accommodation and convergence.

The causes of centrifugal, or third nerve paralysis involving the pupil, are numerous. Probably many cases have a cerebral or nuclear cause, which were once attributed to orbital lesions.

Syphilis is believed to account for fifty per cent. or more of cases. Degenerative lesions of the nerve centers, such as tabes dorsalis and the progressive paralysis of the insane, comes in as a frequent cause, while the toxic neuritis of diphtheria, as a causal factor, is well-known.

Paralysis of the sympathetic nerves, with consequent pupillary contraction, may result from lesions in any part of its course, but in most cases it is a manifestation of degenerative lesion in the nerve centers, particularly of the upper spinal cord.

Inequality of pupils is very rare in health. It may result from anisometropia, particularly if one eye is hypermetropic and the other myopic in refraction. If pathological, it always indicates lesion in the centrifugal channel of pupillary movement, or in the sphincter muscle of the iris itself.

Traumatism may result in mydriasis without affecting the accommodation. It may mean an injury of the sphincter muscle itself, or possibly the terminal filaments of the ciliary nerves supplying it. If the whole muscular tissue is paralyzed, the dilatation of the pupil is regular. If a part only is affected, as sometimes happens when sphincter muscle is lacerated, the dilatation is apt to be irregular.

Unilateral paralysis of the sphincter, no other muscle being affected, would point to a lesion in the ciliary ganglion; to its special group of ganglionic cells in the oculo-motor nucleus or in the tractus fibres destined for the same.

Taking up a few special diseases attended with pupillary changes, we find as a rule narrow pupils in cerebral congestion, and dilated, sluggish pupils in cerebral anæmia.

In meningitis in early stages, particularly if much light intolerance is present, the pupils are contracted, while later they may dilate.

In cerebral hemorrhage, abscess and embolism, the conditions of the pupils alone, apart from other symptoms, have little diagnostic value. If patient is in deep coma, the pupils are apt to be dilated and motionless.

Neoplasms lower vision from optic neuritis or secondary atrophy of optic nerve, diminishing or abolishing pupillary light reflex.

Obviously the location of the lesions, their effect on both the visual centers and those for movements of the pupil in contraction, have much to do with pupillary states.

Abnormal conditions of the pupil are pretty constant in the condition known as tabes dorsalis, and together with other symptoms greatly aid in a diagnosis. The most constant symptom is myosis with absence of light reflex, while reaction to accommodation and convergence remains. This condition constitutes the so-called Argyll-Robertson pupils. Usually an abolition of the skin reflex soon follows. Here then we have a loss of reflex dilatation, associated with a loss of reflex contraction, while associated movement of the pupil in accommodation remains. When the skin reflex is in abeyance, the pupils are often reduced to two (or even one,) millimeters in diameter.

Paralytic affectings of the third nerve, transient or permanent, often point to tabes.

In progressive paresis of insanity reflex rigidity of the pupils is common,—likewise inequality of pupils.

Functional amblypia or amaurosis, usually bilateral more or less complete in degree, often of short duration, may depend on uremia, quinine or lead poisoning or anemia from loss of blood. If effects are from quinine, they are apt to be permanent. Pupils are more or less dilated and may be movable or immovable.

If pupillary movements are preserved, the cerebral centers are affected,—if absent, probably the effect is on optic nerve or retina.

Hysterical troubles may cause sight to go and return suddenly, but its effects are usually more lasting. Here the reaction of the pupils to light, should decide whether the trouble is in the visual centers or in the retina.

PERITOMY IN SEVERE FORMS OF EPISCLERITIS.

By DR. DAVID H COOVER, Denver, Colo.

Oculist and Aurist to Union Pacific, Denver. Gulf R. R., Denver, Leadville and Gunnison R. R., and St. Anthony's Hospital.

EPISCLERITIS

Is sometimes one of the most baffling diseases the oculist has to contend with, often lasting for months, disappearing and reappearing frequently in a different location. There may be no pain connected with it, or there may be severe pain of a neuralgic nature almost constantly. It attacks the episcleral tissue, mostly that portion which blends with the sclerotic and conjunctiva near the cornea, not infrequently involving the sclera.

The inflammatory nodule may be at the corneal margin, or it may migrate from one rectus muscle to the other. Usually it does not affect the vision unless the whole of the episcleral tissue around the cornea is involved. If the corneal nutrition is interfered with, the cornea may become hazy, or small patches of infiltration may be noticed in the deep layers. Finally they coalesce and the whole cornea becomes opaque. It occurs more frequently in adult females, and is occasionally associated with uterine disease.

Persons of rheumatic or gouty diathesis, scrofula and syphilitic taint, or those suffering from malaria are the ones most frequently attacked.

TREATMENT.

Our aim should be to get at the exciting cause and treat it constitutionally. Locally, atorpine, eserine, either alone or alternating, hot fomentations, blood letting locally, internally the salicylates, iodide potash, tonics.

When all forms of treatment fail and vision is endangered, I believe we are justifiable in operative procedure, as the following cases will show:

Julia S., age twenty-one, consulted me for a painful affection of the L. E. Aug. 5, 1887.

HISTORY.

The eye had been inflamed for nine months, during which time it had been under the care of an oculist.

At times the eye would be apparently well, for a few days, a week at the longest, then the trouble would return. Vn. $\frac{20}{30}$. Extending from insertion of tendon of the external rectus muscle to the sclero corneal margin was a large swelling of a dusky red and purplish hue. Sub-conjunctival tissues swollen, vessels engorged and tortuous. There was photophobia and ciliary neuralgia, pain more severe at night, dull heavy feeling around the eye. There was some ciliary congestion, but no iritis, as pupil was active and dilatable.

After four weeks of active treatment the eye was no better, but I noticed opposite the swelling three small opacities in the cornea. In spite of treatment other opacities formed and coalesced.

The case ran along for two months getting worse, the cornea becoming more infiltrated, and vision rapidly failing.

The lady concluded to consult another oculist to which I gladly consented. After two months treatment he advised enucleation.

Much to my disgust she called upon me again with vision reduced to light perception as corneal infiltration had increased and the scleral tissue had become involved, as the whole pericorneal tissue was thickened and cornea opaque.

I proposed peritomy to her, to which she consented. I denuded the sclerotic of it covering 5mm. back from the sclerocorneal margin and with small curette scraped the sclerotic. Only slight reaction followed.

Pain and swelling gradually disappeared and at the end of two weeks there was no trace of the former trouble.

The cornea gradually cleared and at the end of one year vision was $\frac{20}{40}$ and no return of the inflammation. General health improved.

Mrs. S., age thirty-two consulted me January 6, 1888 for a painful inflammation of the right eye.

A week previous to her visiting me she noticed her eye was red, sensitive to the light, dull feeling around the eye, and slight pain. On examination I found over the insertion of external rectus a small swelling of dusky purplish hue slightly elevated, sub-conjunctival tissue engorged. General health poor. Rheumatic diathesis.

Tonics, lithia water, salicylates internally. Locally, eserine, hot fomentations.

Under this treatment the swelling disappeared in a few weeks, and eye was apparently well.

A month later she returned with another attack, which was worse than the first one.

The swelling over the external rectus extended to corneal margin. Same treatment was prescribed but the disease did not respond as in the former attack, but grew worse.

At the sclero-corneal margin I noticed a haziness extending into cornea. I watched the case carefully, but the corneal opacity increased and inflammation was spreading around the sclero-corneal margin.

Peritomy was performed, denuding about one-third of the sclero-corneal margin five millimeters back from corneal border and scraped sclerotic with a curette. Reaction was slight, eye fully recovered with no return of disease.

California Building.

DETACHMENT OF THE RETINA TREATED BY SCLERAL PUNCTURE.

By DAVID H. COOVER, M.D., Denver, Colo.

Mrs. L., age fifty-two years consulted me January 20, 1896. History: On January 2nd, noticed black spots floating before her left eye, flashes of light and vision dim.

On the morning of January 3d, upon rising found that she could not see out of it. General health excellent. No syphilitic or rheumatic history. Upon examination found pupil slightly dilated, Tn. which is nearly always the case in detachments of retina. Vision nil except slight reflex in the lower and nasal field. The ophthalmoscope revealed a detachment of the retina in the upper and temporal field, extending from the ciliary region posteriorly, sagging well down into the vitreous obscuring the disc from view.

The grayish-blue retina was rounded, and vessels full, dark and undulating. The patient was put to bed, and pilocarpine hypodermically was daily administered for ten days without any effect upon the detachment.

I decided to try the scleral puncture which was performed on February 1, 1896. A small quantity of yellow serous fluid escaped, the retina receeded so far that objects around the room became visible, disc and macula came into view, but the detachment returned to its former size in a few days. I concluded to try puncture again, which was done a week after the first operation. This time I performed the operation at night by electric light. I set the patient up in bed, placed a head-mirror on my forehead, and from a ten-candle electric light, held a little behind and to the left side of my patient's head I obtained a beautiful view of the detachment through the dilated pupil, at the same time there was sufficient light to see where to enter my knife, as well as seeing the knife pass into the fluid, as the detachment under the electric light was almost transparent; even those who stood back of me could see the knife clearly. My Graefe knife was entered a little posteriorly of the equator of the globe, as the sagging of the retina was greater at that point. Considerably more serous fluid escaped than from the first operation, the whole of the detachment was seen receding, as the fluid escaped from the scleral wound and point of knife passed through retina. I held it in place until all the fluid escaped, and at the same time could watch the retina as it gradually went back into its proper place. Before withdrawing the knife I made gentle pressure upon the sclerotic both anterior and posterior to the wound until no more fluid could be seen escaping, then gently withdrew it, at the same time depressing the handle sufficiently to incise the retina for drainage.

None of the serous fluid escaped into the vitreous, and no reaction followed the operation.

Light compress bandage was put on, and patient was enjoined absolute rest. On the third day the eye was examined and the retina found in place, but noticed a small hemorrhage in the macula.

No test made of vision until ten days after the operation, as I did not wish to provoke an irritation and undo what had already been accomplished. Her V. then was $\frac{20}{c}$ and before she left for her home, which is in a neighboring state, her V. had increased to $\frac{20}{70}$, and the hemorrhage gradually disappearing.

I am of the opinion that the hemorrhage was caused by my incision, although there was no blood in the vitreous, or any evidence of hemorrhage in macula after the first operation.

I have not seen the case for more than a month, although she reports by letter that her vision is steadily improving.

By this mode of illumination the operator has a distinct view of what he is doing and the result of his puncture before withdrawing his knife. It will also be of great diagnostic value in intra-ocular growths.

LATER.

Since the above was written and forwarded for publication, the patient has returned with a retinal detachment in upper and nasal parts and vision is again greatly reduced.

California Building.

ACUTE GLAUCOMA IN BOTH EYES FOLLOWING THE INSTILLATION OF HOMATROPINE.

By F. T. ROGERS, M.D., Providence, R. I.

It is because I have been unable to find reported in ophthalmological literature during the last five years a case of glaucoma ascribed to the use of homatropine, although the drug is in daily use by hundreds of physicians, and for its bearing in a medico-legal aspect, that I report the following case:

J. M., female, unmarried, 41 years old, a dress-maker, consulted me January 20, 1896, for a dull pain in left eye and impaired vision. Had worn glasses for two years but of late they had become unsatisfactory. There was nothing abnormal in the external appearance of the eyes and

R. V.=0.7.
L. V.=0.6.

The ophthalmometer showed an astigmatism of 1.0 D. with the rule and, owing to the small diameters of the pupils and the difficulty of estimating the refraction by retinoscopy, a disc containing Homatropine Hydrobromate gr. $\frac{1}{50}$, and Cocaine Mur. gr. $\frac{1}{50}$—manufactured by Wyeth of Philadelphia—was instilled into each eye. At the expiration of an hour the vision was tested as follows and the findings were in accord with the retinoscopic tests:

R. V.=0.4, w + 1.00 ⊃ + 0.25 cyl. ax. 75 = 0.
L. V.=0.1, w + 1.50 ⊃ + 0.25 cyl. ax. 105 = 0.9

There was neither pain nor untoward symptoms during the examination, and the ophthalmoscope failed to show anything to excite my suspicion that any serious disease existed.

On January 22d., the date on which she was to return to my office, she sent word that she had caught cold and could not come, and instead I visited her at her home. I found a slight patch of œdema of conjunctiva of left eye but there was neither pain nor impairment of vision and I did not deem it at all serious. There was no increase of tension.

January 24th., at seven p. m., I was called and found the left eye with conjunctiva œdematous, ciliary injection, dilated pupil, shallow anterior chamber, anesthesia of cornea, T+1, and V.= large objects. Media was so cloudy that fundus was not visible. There had been severe pain during the day but no pain at time of examination. Eserine and cocaine was instilled every two hours during the night.

In the morning there was no change in left eye save that vision had diminished to perception of light and the same condition was present in right eye as had been found in the other the previous night. A consultation was held with the family physician and another oculist, and at noon under ether an iridectomy was done in each eye. There was immediate relief from pain, diminution of increased tension, and on January 27th, the vision of each eye had increased to ability to count fingers at five feet.

February 12th. There has been no pain and a steady improvement of vision which is to-day,

R. V.= $\frac{4}{50}$.
L. V.=0.1.

A fair view of the fundus was obtained and there was no cupping of disc, little turgidity of vitreous and slight redness of eye.

February 25th.

R. V.= $\frac{4}{50}$, w—4.50 cyl. ax. 90=0.2.
L. V.=0.1, w —4.00 cyl. ax. 30=0.6.

February 28th. There was during the night pain in right eye and examination reveals a slight hernia of iris at inner angle of corneal wound. Vision reduced to less than 0.1.

March 6th, by advice of consultant, Pilocarp. Mur. gr. ii-℥i was instilled, and the day following a serious iritis with abundant deposit upon the membrane of Descemet was developed.

Since then there has been a slow recovery and slower improvement of vision which is to-day with correcting glass for the resultant astigmatism 0.1 in right eye and 0.3 in left eye.

A few cases of glaucoma have been reported as following the use of cocaine and the question arises whether this was the exciting drug instead of the homatropine, or did the use of the mydriatic have nothing to do with it and would it have occurred anyway. The first question is of value in a medico-legal sense. If the second is true, was the failure to discover it at the time of first examination negligence?

DISTURBANCE OF THE PERCEPTIONS BY CYLINDERS.

By J. R. PHILLIPS, M.D., Philadelphia, Pa.

[*Continued from page 228*]

Convex Cyl., Ax. vertical, over one eye, the other closed, or over both eyes:— Horizontal lines appear longer, and the horizontal dimension of a vertical, square card increased.

Convex Cyl., Ax. horizontal, over one eye, the other closed, or over both eyes:— Vertical lines appear longer, and the vertical, square card increased.

The retinal images in these cases really have the form which we assign to them, due to the combination in a single eye of two images formed by two prisms; for the cylindrical glass may be regarded as acting as two prisms with their bases in apposition. For instance, when viewing a square, vertical surface with the right eye armed with a cylinder ax. vertical, the other eye closed, we have in effect before the eye two prisms with their bases united on a vertical line. These prisms would each produce an image of the square surface in view. The image formed by rays coming through the prism whose base is out would fall upon a more temporal portion of the retina, while that formed by the prism, base in, would be deflected toward the nasal side. These images partially overlap upon the retina, producing a single stimulated area whose outer and inner borders are farther apart than its upper and lower ones, and which is hence no longer square. These effects can be readily seen by employing instead of the cylinder the obtuse angled prism of Maddox, which is composed of two weak prisms with their bases in apposition, ground upon a single piece of glass. By rotating this glass about the visual axis the two images formed by it may be slightly separated vertically, and hence the effect of their composition readily seen.

Concave Cyl., Ax. vertical, over one eye, the other closed, or over both eyes:—Horizontal lines appear shorter, and the horizontal dimension of a vertical surface decreased.

Concave Cyl., Ax. horizontal, over one eye, the other closed, or over both eyes:—Vertical lines appear shorter, and the vertical dimension of a vertical surface decreased.

These appearances are simply the converse of those produced by convex cylinders, and their origin is made apparent by regarding the concave cylinder as made up of two prisms with their edges in apposition.

Convex Cyl., Ax. vertical, or Concave Cyl., Ax. horizontal, over one eye, the other open:—A vertical square card appears a trapezoid rotated about a vertical axis; that side corresponding with the naked eye appearing shorter and nearer than the other. If the card be placed horizontal, so that its surface nearly coincides with the line of sight, it appears a complex figure nearly like a trapezium, its identity with that figure being destroyed by the fact that the lines marking its lateral boundaries are parallel.

A cube so held as to present a vertical and a horizontal surface to view will appear an irregular object somewhat rhombohedral in shape, though, as we have just seen, neither of its visible surfaces is a rhombus.

Convex Cyl., Ax. horizontal, or Concave Cyl., Ax. vertical, over one eye, the other open:—The illusions are identical with those just detailed, but in this case the apparent decrease in size and distance is on the side corresponding with the eye which is armed with the cylinder, instead of on the side of the naked one.

The origin of the illusions stated in the 9th and 10 propositions, was first shown by Dr. John Green and has already been pointed out when speaking of prisms. Let us take the case of a convex cylinder, axis vertical, over one eye, the other being open. On viewing a vertical square card, we will have to deal with retinal images of the same height but of unequal width. (Prop. 5.) It might be anticipated that the less image would be swallowed up, as it were, in the greater, and that no illusion would result, but our judgment seems unable to forget its early lesson that dissimilar retinal images mean the existence of a third dimension in the object. Hence, we have the apparent rotation of the card, bringing the side opposite the naked eye nearer the face. Since, however, the two sides of the card produce retinal images of equal height, though one is apparently farther away than the other, the judgment has no alternative but to consider that the height of the farther side is greater than the other. As this illustration applies to all the remaining illusions, it is unnecessary to dwell farther upon them. An almost endless variety of distortions of geometrical figures is producible by using glasses which cause slightly dissimilar images in the two eyes, and the mode of formation of each one may be found by drawing upon a card the projected form of each retinal image and then placing the card in the stereoscope.

In conclusion, it may be pointed out that much of the ill-described difficulty which patients experience during the first few days of their wearing glasses, and which was formerly ascribed to spasm or to weakness of the accommodation, is in reality due to the disturbance of the ocular perceptions. Fortunately for the refractionist this disturbance is not seriously felt by the inaccurate observers who make up the greater number of his patients. It is to inaccurate observation rather than to evanescence of the illusions themselves that we are to attribute the fact that so little disturbance is caused by such palpable changes in the conditions under which the ocular perceptions take place. As has been pointed out, with persons of specially trained perceptions the illusions are quite persistent enough. In every case the patient should be warned of their occurrence, as otherwise, if they are noticed, they are apt to be regarded as something unprecedented, and an evidence of lack of skill in the refractionist.

Lastly, in mounting lenses it should not be forgotten that these disturbances are greater in proportion as the lenses are stronger and are placed farther from the eyes.

[The illusions spoken of above can never pass away, thus being unlike the metamorphopsia, observed after the correction of oblique astigmatism—EDITOR].

SCOTOMA SCINTILLANS.

By FRANK TRESTER SMITH, A.M., M.D., Chattanooga, Tenn.

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This is an affection of the eyes of which little is said in the books. In its typical form it is rare, but atypical cases are quite common. The characteristics of the affection are as follows: The phenomena begin as a dimness of vision followed by a bright spot apparently in front of the patient. This gradually enlarges, the centre becoming dark and the illuminated line taking a zigzag or "fortification line" shape. After reaching its maximum size it gradually disappears having lasted from a few minutes to an hour.

The line scintillates throwing off sparks of white or colored light. The center of the field of vision may not be affected.

The attack is generally followed by headache which may be confined to one side of the head, sometimes followed by nausea and vomiting.

In the atypical cases the illumination may be absent, the optical appearances vary but there is some optical illusion and this is followed by headache. Indeed it is believed that if the history of migraine is taken carefully that frequently it will be found to be preceded by optical phenomena of this nature.

The following case is related as being almost typical:

E. C., age forty-eight, presented himself at the New York Ophthalmic and Aural Institute with the following history: Three years before had attended the Institute for a "flickering" before the eyes like lightning or fiery snakes used in fire works dancing in every direction; these seemed to be at some distance from the eyes. The attack would last about five minutes and was preceded or followed by a headache. It was increased when both eyes were closed but would disappear in one or two minutes on going into a dark room. Pressure on the eyes made no difference. Never more than one attack a day. Might be absent three months or might have an attack every week but seldom two per week.

Lately the attacks have grown less frequent and now has had none for six months.

The family history was good. Father and mother healthy the former dying at fifty-four the latter at seventy-six. Four brothers and two sisters were healthy. The patient had had no medical attendant for twenty-two years and then for an injury of the leg. Drinks a glass of beer in five or six months. Smokes five or six cigars a day. Sleeps well and is generally healthy. Present complaint is presbyopia for which glasses were prescribed. An examination of the eyes October 6, 1886 revealed the following: Right eye; vision $\frac{15}{30}$, with a convex lens $\frac{1}{2}$ dioptry $\frac{15}{15}$. Field of vision for form normal. Field for red limited to four or five degrees; blue to twenty; yellow and green slightly limited. Left same as right except that field for blue three or four degrees less. A study of this and two other cases which I have had the opportunity to observe closely is sufficient to convince any one that this is a functional disease. It is supposed that it is due to some irritation of the occipital lobes, the location of the center of sight.

A number of remedies have been recommended. With the idea of producing a slight shock to the nervous system, some have cut short attacks by bathing the face in cold water. Others have succeeded with a cup of tea or coffee. Wine has been suggested, also dipping the hands in hot and cold water alternately. Most patients feel easiest with the eyes closed and by keeping quiet. Cases vary considerably in severity.

Some may require no treatment but the assurance that the affection is without danger. In most cases indications whether local or general should be met. General remedies tonics and sedatives should be kept in mind and spectacles should not be forgotten.

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DEPARTMENT OF
Otology, Laryngology and Rhinology.

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A CASE OF INFLAMMATION OF THE MASTOID FROM TYPHO-MALARIAL FEVER.

By DAVID WEBSTER, M. D., New York.

Mrs. Lizzie F. A., aet. 28, born in New Brunswick, and the wife of the Connecticut hatter, had an attack of typho-malarial fever about the middle of December, 1894. She was confined to her bed six weeks. One month after the onset of the disease she was attacked with earache in the right ear. After a week of pain there was a discharge from the ear. Her attending physician thought it a simple affair and, depending upon her general condition, would soon get well. She had no local treatment except filling the ear with warm water from time to time.

After the discharge had continued several weeks she had severe pain and swelling behind the ear in the region of the mastoid, and her physician advised her to seek the advice of a specialist. She came to New York and consulted an aural surgeon about February 15th. He performed paracentesis of the membrana tympani two or three times, syringed the ear with hot water, and practiced inflation of the drum by Politzer's method. The swelling over the mastoid and the pain still continuing, he advised her to return home and have leeches applied. Her physician leeched her repeatedly until twelve leeches had been applied over the mastoid. He then made a small incision into the swollen tissues. She says that no pus was evacuated and that the wound soon healed. She continued her visits to the city to consult the aural surgeon from time to time. The pain and swelling behind the ear continuing he applied the artificial leech, abstracting some two ounces of blood. Not being relieved she returned home and on April 23rd, her physician made another incision back of the ear. The next morning he enlarged this incision. She was admitted as a house patient in the Manhattan Eye and Ear Hospital, and came under the care of the writer on April 25, 1887. She was pale, thin and cadaverous looking. She had an anxious look and was, apparently, very much run down. There was an incision about three-fourths of an inch in length over the upper part of the mastoid. Examination with a probe showed that there was a sinus extending high up in the temporal bone. Pus was being discharged both from the external auditory canal and from the wound back of the ear.

April 28th. The treatment has been syringing the ear thoroughly twice a day, cleaning out the opening over the mastoid, inserting a drainage tube and applying a dressing. When she came in, she could not hear a watch when pressed against the ear. To-day, H. D. R. $\frac{1}{40}$.

April 30. Patient already improving in general health. Ear discharging less. Wound draining well. Generous diet and Kumyss. Temperature has been normal. There is quite a large sinus leading up in the temporal bone from the upper part of the incision, and from which there is a discharge of pus. Patient complains of pain all over the side of the head and down the neck.

May 6th. There did not seem to be sufficient bone drainage, so the patient was put under ether and the incision was extended in both directions. The sinus in the bone was enlarged and a large quantity of granulations and dead bone were curetted away. A drainage tube was inserted and the wound dressed with compress and bandage.

May 10. Acute symptoms are not so great. The wound drains well and the discharge from the ear lessens day by day.

May 13. To-night the patient complains of more pain in and about the wound. She has had a headache all day. There appears to be an induration of the soft tissues above the incision, also a swelling along the sterno-cleido-mastoid muscle. At these points the patient complains of pain.

May 15. The swelling of these points seemed to have increased, and now there is also swelling of the face immediately in front of the auricle. The external auditory canal is swollen on its anterior aspect and is tender to the touch of the probe. No discharge from the canal. There is free drainage from the incision. Poultices as hot as the patient could bear them have been applied all day to the swollen parts both behind and in front of the auricle.

May 16. Poultices discontinued. There seems to be less swelling of the side of the face, but the swelling has extended to the lower lid. There is very little redness and that little is circumscribed. There is pain on pressure of the swollen parts. On consultation with Dr. Roosa it was concluded that the swelling was probably erysipelatous. The patient was isolated and put upon quinine and iron in large doses. Temperature normal all along.

May 18. For two days there has been continued improvement, the swelling diminishing and the general condition improving.

May 22. Patient up and about. Appearance of face normal. Slight discharge from ear and wound.

May 24. Patient steadily improving. Drainage tube removed and tent substituted for it. Still slight discharge from the ear.

May 29th. Condition unchanged.

June 1st. Wound filling up from the bottom. General condition improving.

June 17th. The general and local treatment have been continued. Last night the patient had severe pain in the right side of the head preventing sleep. Discharge from the wound as free as usual, not so free from the ear. At 3 p. m. temperature 99 $\frac{2}{5}$.

July 1st. Since last note there has been poulticing of the wound day and night, with general tonic treatment. The patient's general condition has improved very much. The ear has been discharging less and less and the sinus in the bone filling up gradually from the bottom.

July 25th. The opening over the mastoid has been gradually filling up until now there is no opening. There is no discharge from the ear and the watch can be heard in contact. The sinus in the mastoid has been filled with gradulation material, no bone being reproduced. Patient discharged "cured."

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OPERATIONS PERFORMED IN THE EYE DEPARTMENT OF THE MEDICO CHIRURGICAL HOSPITAL.

By L. WEBSTER FOX, M.D.

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During the year ending 1895, 2,666 patients received treatment in the ophthalmic department of the hospital.* Three hundred and three operations were performed, and in this article I shall briefly describe the methods, technique and treatment followed in these cases. No fixed method was adopted, as each case was a law unto itself, so I tried to adapt such lines of procedure as in my judgment was deemed best for each individual patient. The greatest care was exercised in carrying out the after treatment from day to day; the hygienic surroundings were the best that an up-to-date hospital could afford, and the results obtained were commensurate to the great care and attention bestowed upon these patients.

CATARACT OPERATIONS.

Twenty-seven operations were performed, including in this number three needle operations on infants.

PRELIMINARY TREATMENT ESSENTIAL IN CATARACT OPERATIONS.

I deem it of the greatest importance to interrogate all cataract patients presenting themselves for an operation, as to their general habits and family history, and to make a careful examination of the urine, restricting meat diet and in creasing a vegetable one; also placing the patient. one week before the operation. on mixed treatment, and paying particular attention to bathing both eyes with a boracic solution containing sulpho-carbolate of zinc, examining the eyelashes and particularly the nasal cavities. If any catarrhal affections are found in these cavities it is of paramount importance that they receive the proper treatment before the operation is performed. The day before the operation the patient is given a warm bath. a saline purgative, kept in bed, and his face washed with castile soap and water, then washing the skin around the eye to be operated upon with ether. following this again with a 1-5000 solution of corrosive sublimate. after a German method (Schweigger). These precautions are repeated in all cases where the cornea of eyeball is incised. and just before the incision additional precaution is taken by dropping on the cornea one or two drops of 1-5000 corrosive sublimate solution. The instruments are sterilized. and all fluids, such as atropia, etc., are boiled in a Llewellyn flask.

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*See appendix for classification of operations.

METHOD OF OPERATION.

In childhood or adults up to thirty years of age the needle operation was performed. The cornea being divided into quadrants. the lower and outer quadrant being again subdivided and a Bowman stop-needle inserted midway between the centre of the cornea and scleral margin. the lens capsule torn by an upward and downward, as well as horizontal, movement of the point of the needle, the central anterior portion of rior aq. chamber the stream should be directed into this through the pupil, when the iris will balloon forward, and the cortex come through the pupil and escape through the incision. In using this method I have never failed to remove easily and rapidly all of the cortex and leave the pupil perfectly black.

Some able operators do not enter the anterior chamber with the nozzle, but simply direct the stream against the corneal incision. This I think is open to two objections: first, it is not so effective; and second, it may force germs from the conjunctiva into the aq. chamber (Knapp).

It has been urged against irrigation that it causes punctate opacities of Descement's membrane and iritis. To the first objection I would say it is only after using sol. mercuric biniodide that those opacities have occasionally occurred, and for this reason I do not use that solution. To the second objection I would answer that the salt solution at 100° F. properly used is much less likely to produce iritis than is the irritating cortex if allowed to remain.

Among the advantages possessed by irrigation is that of restoring a prolapse of the iris, and bringing about a central, circular and contracted pupil. And in escape of vitreous it is perhaps the only safe method of removing cortex.

There is yet another class of cases in which irrigation is most valuable. I refer to those cataracts in young adults where the nucleus is too hard to be dissolved by the aq. and removed by absorption, and yet the cortex is so soft that the lens cannot be extracted *en masse*. If we attempt extraction in these cases the nucleus will be expelled, but the cortex will remain behind as a semi-liquid, gruelly mass. It was in such cases that suction through a tube, introduced into the anterior chamber, was formerly employed. But better than this is irrigation, which rapidly and completely clears the entire aq. chamber of all cortex. This, it seems to me, is one of the most valuable uses of irrigation, for it puts into the legitimate field of rapid and complete extraction many cases that would otherwise be treated by slow, dangerous and doubtful absorption. Again in traumatic cataracts of the young, where the cornea and iris are often wounded, and complete extraction is made difficult, because of the softness of the lens, irrigation is most valuable. In slowly ripening, immature senile cataract, in that class of cases in which artificial ripening is sometimes done, extraction with irrigation is rapid and, I think, the safer method. After the free use of irrigation in such cases we may be reasonably certain that no transparent cortex remains.

I have used irrigation for two years in all the classes of cases referred to in this paper and have only favorable reports to make. It is not necessary in every extraction, but in many it is very useful, and in some it is essential to success.

246½ N. Summer Street.

SOME CASES OF A HIGH DEGREE OF HETEROPHORIA WITHOUT SYMPTOMS.

By E. C. ELLETT, M.D.

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My personal experience has never impressed me with the necessity for so many graduated tenotomies as some find indications for doing, and I am pleased to see the pendulum swinging towards conservatism as regards the operative treatment of these cases, toward relying more on careful correction of refractive errors, supplemented by exercise of the weak muscles and training of faulty nerve centers, and not so much on operations to reduce the strength of the opposing and probably normal, muscle to a point where it can no longer predominate over its weak antagonist. It is a matter of common observation that heterophia of moderate degree, that is 1° or 2° of esophoria at 6 meters, and as much or twice as much exophoria at 33 centimeters, is as much the rule as small errors of refraction and the

the lens broken up, being careful, however, not to disturb too much of the lens substance. This avoids too rapid swelling of the lens, and secondary results, such as cyclitis or even iritis, developing. The eye is carefully prepared for the operation similar to that followed in senile cases. The after treatment is also the same. In adults I follow, as near as possible, the Moorfields' incision. The eye is held by a grasp of conjunctiva, in the fixation forceps, at the scleral margin of the cornea down and opposite the point of puncture, which last is to be one or two mm. from the upper and outer quadrant and three mm. below the horizontal line, passing through the corneo-scleral puncture. The blade (Critchett's knife) is directed toward the tip of the patient's nose, and enters parallel with the iris. In this direction it is pushed forward till the point of the knife has reached the centre or a point but little past the centre of the anterior chamber, when the hand is dropped and the blade pointed towards the place of counter puncture, directly opposite and similarly located to the point of puncture. The blade is pushed on through the tissues till the end of the cutting edge towards the handle is at the lips of the puncture. The edge of the knife is now turned a little forward, so that it shall come out in the cornea at its upper margin; this is brought about by an easy and moderately rapid sweep, combined with a slight elevation and circular movement in withdrawing the hand. If too much tension be not given the muscles of the hand, the cut is finished by this procedure. If the hand suddenly grows rigid it will be impossible to finish the cut, and a sawing motion must be made. To the novice this will frequently happen, but should be corrected as soon as possible, as the serrated edge of a wound which always follows this see-sawing makes an entrance for pathogenic germs and the wound does not close up as rapidly or as firmly as by the one sweep. The iridectomy forceps are now entered, closed, and advanced till their points are opposite the pupillary edge of the iris, when the forceps are allowed to open and grasp the iris. This is drawn out of the lips of the wound and slightly advanced till it is rendered taut; the lower blade of a DeWecker scissors are now gently slipped under the projecting iris and held horizontally and firmly in place, while the upper blade is made to descend and sever the iris with one cut. In this way the ideal key-hole iridectomy is obtained.

To the rupturing of the capsule with Jäger's cystotome I wish to call especial attention. These delicate hooks are at right angles to the handle; they are made to conform to the anterior portion of the lens. The point is inserted into the anterior chamber, posterior to the iris and hooked into the capsule, by a gentle upward movement of the hand, the lens is rotated about its antero-posterior axis and thus torn from its zonular attachment, the capsule will only rupture after the insertion of the hook is brought to the surface of the wound and the instrument is drawn horizontally along the edges of the primal incision. By this rotary movement of the cataract the posterior capsule is torn or the lens is delivered with the capsule, doing away with the secondary operation. When I find that the posterior capsule remains intact and is visible I rupture it at once with the cystotome. When the capsule is somewhat thickened I find that Jäger's hook will not rupture the capsule as easily as the straight cystotome of Daviel. It will rotate the lens as I have described above, and the advantage claimed for it is that we have fewer secondary operations to perform. If the capsule is thin it tears very easily, and by making a rectangular incision we can tear off almost the whole of the anterior capsule. The lens is then easily delivered with a Daviel's spoon. Especial care must be noted that no cortical matter remains behind, and that the edges of the iris are freed from the lips of the corneal wound.

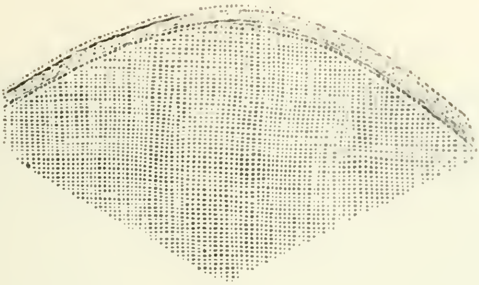

FIGURE 1.

The after-dressing in cataract operations is a very important factor towards its successful termination, nearly every ophthalmic surgeon having his own peculiar way of applying a dressing to an eyeball, some following the "rational method," devised by Michel and Chisolm, or the Von Graefe or modifications of the same or both. The preparation of the dressings always takes considerable time, and their adjustment is not always satisfactory. *The eye-pads now used in the hospital are of two kinds, black and white, and are made as follows: First, a lining of antiseptic gauze, then a layer of absorbent cotton, next the black linen sheet, and lastly the white gauze for the external covering. The smaller pads, Fig. 1, fit closely over the eyeballs (lids closed), the material being identical with that of the larger ones. The size of the larger pads, Fig. 2, is six and a half by three and a half inches. Both large and small pads are shaped and cut by a steel die, so as to assure a uniformity of size and thickness. They fit comfortably and evenly to the face, being held in place by adhesive strips.

There are still a few ophthalmic surgeons who think it quite unnecessary to take all these precautions, but happily the number is growing less year by year, and the percentage of successful operations growing higher and higher. The results of thus carrying out the details of the technique was very satis

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* Made by Seabury & Johnson.

factory, no losses from panophthalmitis and but one case of iritis followed. This was a patient of hemorrhagic diathesis. There was considerable bleeding from the incised iris, the anterior chamber filled with blood and kept oozing for two days. At the end of the third day the anterior chamber commenced to clear up, but subsequent iritis closed the pupil. An iridotomy later gave the patient useful vision.

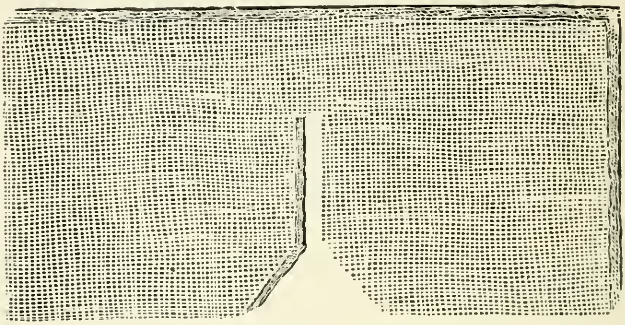

FIGURE 2.

The visual corrections varied from 20-100 to 20-20. In those cases which had the lowered visual acuity, it was found that we had to deal with intra-ocular disturbances, such as vitreous opacities, retino-choroiditis, etc.

GLAUCOMA.

Four acute and twenty chronic cases. In the whole domain of ophthalmic surgery I have found this the most difficult operation to perform and gain a permanent benefit. In acute cases we do get immediate relief, but in chronic cases it is not so successful.

The operation which I follow is that taught by the late Prof. Mauthner. The incision well into the sclerotic with a broad keratome, three to four mm. from the corneo-scleral margin and removing, at least, one-sixth of the circumference of the iris. Instead of cutting the iris with one snip of the DeWecker's, three cuts are made—this gives a broad iridectomy and the edges of the iris do not become incarcerated in the lips of the wound. The same precautions are taken with the cleanliness of the eye and instruments as in cataract operations, and dressings are also the same.

ARTIFICIAL PUPILS

Ten cases. The leucomas of the cornea which necessitated these operations were the sequelae of ulcers of the cornea and traumatism.

IRIDOTOMY.

Eight cases. These closed pupils followed cataract operations or injuries. The method followed was with a broad needle cut the cornea two or three mm. from its scleral margin, temporal side, in the vertical direction, and drive the needle through the iris into the vitreous chamber. In withdrawing the needle (which is a spear-shaped instrument, two mm. wide at its greatest width), we make a slight upward incision in the cornea, forming an opening four to five mm. long, large enough to admit the closed blades of a DeWecker's scissor's into the anterior chamber, and as soon as the points of this instrument have entered they are allowed to open, so that the second blade enters the opening in the iris and is allowed to pass behind it, while the other blade passes in front of the iris in the anterior chamber; by making one cut a well-defined opening is made. In some cases where the fibers of the iris have lost their resiliency it may become necessary to make an upward or downward cut as indicated.

This same operation is also performed where the thickened capsule remains after a cataract operation. The capsule is easily removed with a Tyrrel's hook or by an iris forceps, if necessary. I infinitely prefer it to the old-fashioned way of needling the capsule.

ENUCLEATION AND MULES OPERATION—EVISCERATION.

The enucleations were after the Vienna method, that is, completely denuding the sclerotic of all conjunctival and mus cular attachments, and after taking out the eyeball the eyelids are pressed into the orbital cavity with a ball of sterilized lint, and held in place by a pressure bandage for twenty-four hours. The method above described gives an excellent orbit for an artificial eye. In this operation the edges of the conjunctiva are never stitched with sutures.

Evisceration (Mules) was performed in twelve cases, as they have been described elsewhere.* I shall simply refer to this method to say that it is the ideal operation for the proper adjustment of an artificial eye, and now I do not remove an eyeball except under extraordinary circumstances. The details of the evisceration operation are carried out under ether, as follows: The eye is thoroughly irrigated with a lotion, which I shall call formula No. 1, to designate it from almost the same formula for sterilizing instruments.

FORMULA No. 1.—IRRIGATING FLUID.

Hydrarg. bichlor.	1-50 grains.
Zinci sulphocarbolatis.	30 grains.
Aq. menth pip.	2 drachms.
Aq. camph., aq. destil., (aa.).	2 ounces.

M. ft. Sol. Used hot.

The same formula is used for instruments without the hydrargyrum.

The eyelids are separated with the ophthalmostat. The conjunctiva is dissected from its corneo-scleral attachment, back to about the equator of the eyeball, no attention being paid to the cutting of the muscles, and they are separated from the eyeball in every instance, uniting again in the process of healing. Then the cornea is excised, this being best done with a large Beer's knife, as in performing a flap operation for cataract; the lower half of the cornea is then removed with curved scissors, and the contents of the globe are taken out with a small scoop (Fig. 3) devised for the purpose.

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*See "Codex Medicus" and "Medical News."

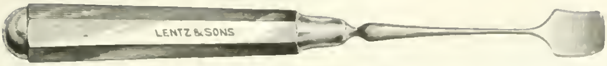

FIGURE 3.

Great care is necessary to remove the ciliary bodies, choroid and the head of the optic nerve, leaving a clean white sclera. Mr. Carter has devised a rubber bulb, which is inserted into the scleral cavity and inflated with air to produce pressure on the central artery, preventing hemorrhage.

As this application has not been a success with me I pack the scleral cavity with sterilized gauze. After waiting a few minutes this is removed, and the contents of the scleral cavity are again thoroughly irrigated with antiseptic fluid and again packed.

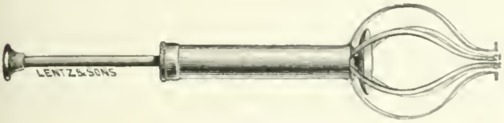

FIGURE 4.

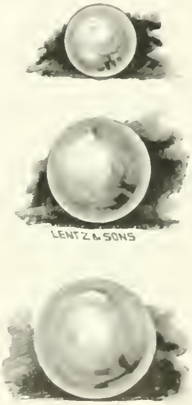

FIGURE 5.

A sterilized glass globe (Fig. 5), which is best suited to the case, is then inserted with a specially devised instrument (Fig. 4). The sclera is split so that the edges may be drawn together and held by stitches of No. 4 black silk, using large needles, thus completely hiding the glass ball. The orbit is again thoroughly irrigated with the hot solution, the palpebral space packed with sterilized cotton, saturated with lotion No. 2, and this dressing is kept wet day and night for twenty four hours, when the cavity is again bathed with hot water and fresh dressings applied, continuously saturated with the lotion, over which is bound a sterilized bandage.

FORMULA NO 2.

Zinci chlor	10 grains.
Liq. plumbi subacetatis	2 drachms.
Tinct. opii	
Tinct. belladon, (aa)	1ss drachms.
Aq. camph.	
Aq. destil, (aa) q.s. ad	4 ounces.

M. ft. Sol. Apply cold or iced.

At the end of twenty-four hours the upper eyelid is somewhat swollen, puffy and oedematous, but the tumefaction gradually disappears. As a rule the conjunctival sutures are not removed under six to ten days. It is important that both eyes are kept bandaged for at least six days. By allowing the liberty of one, too much rotation of the eye is permitted. As a sequence, the antagonistic muscles of the operated eye pull apart and there is great pressure against the sutures, which are liable to be torn out.

Up to the present writing I have performed thirty operations and have had but three mishaps, the glass ball coming out on account of faulty stitching of the sclerotic coat. In the first case the catgut gave way and in two others the silk was too fine and broke before the cicatrical adhesions were formed. Both Mules and Bickerton have had cases where the glass balls came out.

THE SURGICAL TREATMENT OF GRANULAR LIDS.

The modified grattage operation was followed. When in Paris in 1891 I saw it put to a practical test by Dr. Darier, and I also had the opportunity of examining a number of patients upon whom the operation had been performed with gratifying results.

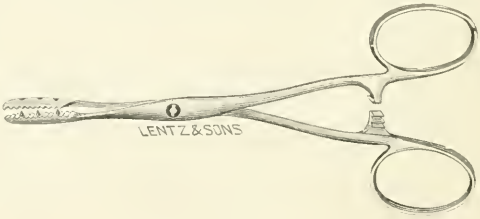

Figure 6.

Two instruments have been specially devised for the operation.

Fig. 6. A catch dressings forceps having on the male blade three pins, which, when the instrument is closed, pass through the corresponding openings in the opposing or female blade; these points pierce the eyelid, thus preventing slipping when complete eversion of the upper lid is made.

Fig. 7. The second instrument is a tri-bladed scarificator or scalpel; the outside blades are jointed so that they may be easily turned when being cleaned. They are securely held in place in a platinum handle, and make parallel incisions.

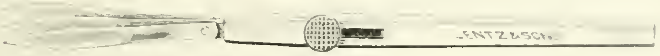

FIGURE 7.

The details of the operation are as follows: The upper eyelid is grasped by the forceps, along its margin, then turning the edge upon itself the lid is rolled up until the retrotarsal fold is brought out. The exposed part is now thoroughly scarified with the three-blade scapel, not only horizontally, but vertically. The granular tissue is then scrubbed with a tooth brush, the brush having been steeped in a corrosive sublimate solution 1 to 500 just before using. Immediately after the grattage, the part is washed with the 1 to 500 solution.

Another part of the lid is unrolled and the scarifying, scrubbing and washing repeated, and in like manner the whole of the eyelid. The lower lid is then similarly treated, and if necessary, the operation is extended to the other eye. If extensive pannus of the cornea exists, peritomy may be performed.

In 1883, I hastened the cure by eversion of the upper lid and excising the granulations with the curved scissors and scraping the parts with a scoop and followed this operation by cutting through the cartilage from the inner to the outer canthus; in other words, I followed the scraping operation by a

Burow incision.* This relieves the friction of the lid upon the globe by allowing the tissues of the lid to elongate.

There is very little reaction in this apparent harsh treatment. The patient is put to bed and a lotion (formula No. 2), applied. The eye pads are kept saturated for two or three days, and the results obtained, when the operation is carried out properly, are exceedingly gratifying. It is rarely that the operation must be performed more than once.

The French method is to turn the eyelid after twenty-four hours and apply to the conjunctival surface again the 1 to 500 solution of sublimate. In my experience it is very painful and is not necessary. The constant application of the antiphlogistic lotion does better.

EPIPHORA. LACHRYMAL ABSCESS.

Thirteen cases. Treatment: Local applications are only palliative measures. When epiphora exists, due to a narrowing of the puncta, relief may be obtained by dilating, with a fine-pointed probe; when, however, one is dealing with a stricture or an abscess of the canal, more radical measures must be applied. Slit up the canal with a Weber's knife and follow this by passing a good-sized probe through the canal, and then insert a silver style. The slitting of the canal and passing the knife downward is apparently a simple operation, but still one not free from danger—false passages are easily made, or the knife may break by wedging it within the bony canal.

In cases where there is pronounced swelling and edema of the lids, it is better to use the antiphlogistic lotion for several days before opening the canal with the knife. If the abscess has "pointed," Petit's method of opening should be followed, i. e., incising the abscess and passing the knife into the canal below the lachrymal sac.

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*See Fox and Gould Diseases of the Eye. Second Edition, page 85.

STRABISMUS. SQUINTS.

Convergent strabismus. Eighty-six operations were performed. The method followed was, first, to place the patient under a mydriatic, and correct the ametropia, making an allowance for the full or partial correction according to the degree. The rotation of the eyeballs being noted, etc., then a complete or partial tenotomy is performed, as indicated. Under cocaine a vertical incision is made over the insertion of the tendon of the internal rectus. The conjunctiva is drawn away and with the points of the scissors snipping Tenon's capsule thus exposing the muscle. A hook is inserted under the muscle, which is gently raised and as it is drawn away from the eyeball one blade of the scissors inserted underneath, the second blade to the outside of the tendon, and with one or two cuts the muscle is separated from the eyeball. Only one eye is operated upon at one sitting. It may be necessary also to perform a partial tenotomy of the superior rectus when the squint is more than four lines. I do not operate on children under ten years of age.

Divergent squint Nineteen operations. This was a very disappointing operation to the older surgeons and a very tedious one to the present day surgeon. Since its introduction by Prof. Guerin it has undergone various modifications at the hands of Von Graefe, Critchett, Bowman, Knapp and others.

For a moderate degree of divergence I prefer snipping the external rectus and advancing conjunctiva and Tenon's capsule This is best done by taking out an oval piece of conjunctiva and tenous capsule (DeWecker's operation) with a T-shaped forceps and then uniting the edges of those tissues together.

In the pronounced cases I now follow the operation suggested by Richard Williams, of Liverpool. "An incision is made in the conjunctiva and subconjunctival tissue over the tendon of the internal rectus, extending from near the margin of the cornea for about half an inch towards the inner canthus. The edges of this incision being separated and an aperture having been made in the capsule, the strabismus hook is in serted under the tendon in the usual way, and then confided to an assistant; a curved needle, armed with a suitable silk thread, is then inserted in the conjunctiva near the margin of the cornea and carried between the sclerotic and conjunctiva towards the muscle behind the hook. It is then passed through the tendon from edge to edge at right angles to the course of its fibre, and brought out at the opposite side of the conjunctival wound. The edge of the conjunctiva at this side of the incision is now raised with a pair of forceps, the needle is insinuated between it and the sclerotic, and brought out near the margin of the cornea at the point corresponding to the point of entrance. At this juncture, the external rectus may be divided or not, according to the requirements of each individual case. This point having been disposed of, the tendon of the internal rectus is divided at a safe distance from the ligature and the hook is removed. By now tying the two ends of the loop together, the margin of the cornea is brought into opposition with the cut end of the tendon and the eye brought into a position of more or less squint. Finally, the edges of the conjunctival incision are brought together by means of a fine suture." According to Williams, and I have been able to confirm this, the advantages claimed for the operation are (1) that it is much shorter and simpler than the usual method; (2) that by passing the ligature in the manner described, a very firm hold is obtained, both of the tendon and of the conjunctiva, which is sometimes apt to tear; (3) that no anaesthetic is finally required.

PTOSIS.

Two cases. Prof. Panas' method followed and splendid success obtained.

TATTOOING.

Six cases. The operations were performed for cosmetic purposes and they were successful. I use the four-needle prick suggested by DeWecker. The success of these operations lie in using plenty of India ink. One disappointment which takes place is that the ink fades away after a certain time. This is not the case if the ink is of the consistency of paste when applied to the leucoma of the cornea and thoroughly driven into the tissues by the needles.

PERITOMY.

Eleven cases. Operation: A complete circular band of conjunctiva is dissected around the cornea—one centimetre in width. When the pannus is pronounced, I make a circular incision of the corneal blood vessels with a Beer's knife. The results obtained are very satisfactory and only in few cases is it necessary to repeat this latter operation.

PTERYGIUM.

Five cases. The pterygium is always transplanted. This is done as follows: An incision is made in the conjunctiva above and below the growth, along its borders from the cornea to the caruncle. The conjunctiva slightly dissected above, but very extensively below the growth, making a pocket which extends to the insertion of the inferior rectus muscle. The pterygium is then separated from the eyeball with scissors, leaving, however, the corneal attachment intact, and then raised, and a needle (two needles are threaded on one strand of silk) is passed through the corneal end of the pterygium from the upper side downwards; the second needle is passed in like manner, but brought out upwards, leaving enough tissue between the two threads that will not cut through; with the strabismus hook the pterygium is separated from its corneal attachment (Prince), and is then turned downward into the cul-de-sac, the needles, one at a time, passed through the conjunctiva over the insertion of the inferior rectus muscle, bringing the head of the growth almost in contact with the inferior muscle, to which it unites, being held in place by the silk thread, which is tied in a knot. This brings the raw surfaces of the pterygium against the raw surfaces of the eyeball. The edges of the conjunctiva are brought together over the pterygium and while there is some puckering of tissue in the caruncular space, it usually disappears, making a successful operation.

I have only attempted in a brief way to give a general idea of my surgical procedures. In many instances I was obliged to apply such methods as the exigencies of the case required, but in the main I have followed the lines as described above. In the minor operations the every day practice was adopted.

During the last six months I have restricted my operations in certain lines and expanded in others.

APPENDIX.

Anchyloblepharon	1
Advancement muscle	19
Burows	12
Bowman's with style	3
Cataract	27
Curetting ulcer of the cornea	1
Capsulotomy	2
Enucleation	10
Grattage	12
Glaucoma, acute	4
Hordeolum	3
Iridotomy	8
Iridectomy	30
Lachrymal obstruction	4
Lachrymal abscess	6
Mules' operation, Evisceration	13
Pterygium	5
Peritomy	11
Ptosis	2
Paracentesis of cornea	2
Removal of proud flesh after Mules	1
Removal of scar	1
Removal of foreign body from eye	20
Removal of granulation after tenotomy	1
Removel of tumor from lid	1
Sclerotomy	3
Saemisch operation	1
Tarsal cyst	8
Tenotomy	86
Tattooing of cornea	6
Stretching of lids	2
Symblepharon	1
Operations performed	303

1304 Walnut street, Philadelphia, Pa.

EVERY-DAY MUSCLE-TEST WORK, WITH EXPLANATION OF THE BEST LIGHT AND APPARATUS.

By G. EDGAR DEAN, M. D., Scranton, Pa.
Oculist to Lackawanna Hospital.

In these days of rapid progress, no oculist is excusable if he fails to habitually test the muscular balance of his patients' eyes. The percentage of cases in which he uses prisms may be small, and of partial tenotomies very much smaller; still this does not signify. The occulist wants a reasonably thorough understanding of his case and a tangible record of the same for future reference. These he cannot possess without having tested the muscular balance.

If one wished to become an expert in inspecting horses he certainly would give some attention to the harness and to the action of the team in double harness; and the analogy is complete, for our eyes have to work in double harness both ways, that is, the lateral recti act as one set of double traces and the vertical recti (superior and inferior) act as another set.

It is not difficult to understand that if one rectus muscle be weak, or if one pair, for example the interni, be overdeveloped, the muscular balance will, in either case, be interfered with.

And almost any educated mind can appreciate the importance of the oculist's understanding such conditions in order to give correct advice to his patients and in certain instances ward off danger.

If this paper shall succeed in so impressing some oculist who has been negligent in this matter as to stimulate him to more comprehensive work, and aid some poor fellow who has been confused in his ideas of the subject to a more lucid understanding of it, then its principal mission will have been accomplished.

The systematic study of this subject has developed so remarkably in the past few years that it may properly be regarded as a new field. Like most other matters of a scientific nature, the development has been of an evolutional character. As it appears, two things served for starting points for this tremendous growth: one was the devising of the glass rod test by Dr. Maddox, of Edinburgh (1890), and the other was the introduction of an entire system of terminology by Dr. Stevens. Not long after we had begun to use the somewhat crude Maddox rod, the rotary prism of Crete appeared on the scene, as an importation from France. This I still regard as a valuable instrument, not readily superseded as a convenient factor in testing the muscular power.

The ingenious rotary prism seems to have put an idea into the head of Dr. Prince, now of Springfield, but then of Jacksonville, Ill., and he, taking the glass rod, which Dr. Savage had improved by reducing in size, placed in front of it a rotary prism which would develop a graded test up to four degrees of heterophoria. It should be noted that this instrument had lettering to indicate the muscular defect provided it was applied to the right eye. The combination of the rod test with a rotary prism marked a great stride of advance. But this ingenious instrument was destined to wear the laurels for a brief season only. Dr. Risley reduced the rotary prism to such small dimensions that it could be used in a trial frame; and then Dr. Edward Jackson hit upon the happy thought of grinding a prism upon a large test rod and making another prism rotate in front of it. This affords a much larger aperture than the phorometer of Prince and at the same time increases the prism power to ten degrees in place of four.

This instrument, which is the best of the hand phorometers, is made by Bonscheur & Holmes, of Philadelphia, and was first publicly exhibited by Dr. Jackson at the Milwaukee meeting of the American Medical Association in June, 1893.

But if one wants the best phorometer of all up to the present date, regardless of expense, he will supply himself with a Stevens phorometer, set in the adjustable bracket devised by Dr. J. Frederick Herbert, of Philadelphia. As it is applied to both eyes and has plenty of size, it is exceedingly convenient, quick and accurate. This latter point is of paramount importance in the operative cases.

I fancy, however, that in one respect it is lame. Being a test in which prisms of equal strength are applied to both eyes, it does not seem capable of determining readily which eye is most at fault in case of muscular irregularities where the eyes are unequally affected.

In using the hand phorometer (Jackson's or Prince's) a good idea of these cases may be obtained by changing the phorometer from one eye to the other. But I think a better way still is to make use of the six-degree double prism at twenty or twenty-one feet, and test each eye separately. This may be supplemented by testing the dynamic power of the muscles with prisms, preferably a rotary prism, and placing the prism first over one eye, then over the other.

Now, supposing the oculist to be armed with a suitable phorometer, the next point of interest is to have a suitable object arranged at a suitable distance for the patient to gaze at. A flame of small size is best, but it should neither be too dim nor too brilliant.

It was reserved for Dr. Herbert and myself to develop this subject. He was working on one branch of the subject, elaborating a chart composed of white squares on a black background; and at the same time I was engaged at another branch, adapting the electric light for use in this work.

His chart was ready about the time I had gotten the electric light arrangements perfected; and with the two used in combi nation I am blessed with the best and readiest arrangement extant.

The electric light used is from the street circuit, hence it is always ready for use. The street main carries a continuous current of 110 volts (Edison system); but the alternating current could be used.

I use a three candle power incandescent lamp on a socket of corresponding size, placed directly in the center of the cross of Dr. Herbert's chart (as prepared and sold by Bonscheur & Holmes, Philadelphia).

This small lamp, of course, is not allowed to take the full current of 110 volts, but only such portion of it as is let through two Edison lamps, one thirty-two candle power, the other sixteen candle power. Now as a thirty-two candle power lamp will let through about one ampere of current, it follows that I am using for my little lamp approximately one and a half amperes of current. These larger lamps—which are in a sense resistance, though so arranged that the greater the number of them the less the resistance—are placed in the basement where they cause no inconvenience, my office being on the ground floor. In case one had his office upstairs, they could readily be inclosed in a box to hide them.

The switch for turning on and off the light is placed at the point where my patient sits for the muscle test work. In order to get this point twenty-one feet from the test light, I have placed the light on the wall of my third or operating room, where the shades are mostly kept drawn; and the switch near the middle of the general work room, at one side, directly opposite the door to the operating room. Thus the patient looks through the open door at the wall opposite and sees the light in the center of the blackboard, which is hung at a suitable level for the patient sitting. One beauty of the arrangement is that two chairs can at all times be kept in position by the switch for use of patient and oculist, so that everything is in readiness there; just as two chairs are always behind the table which holds the case of trial lenses; and at another part of the room a chair is always kept at either end of the ophthalmometer of Javal. In this way the patient moves from one part of the room to another for the various forms of examination, and no time is lost in preparing tests.

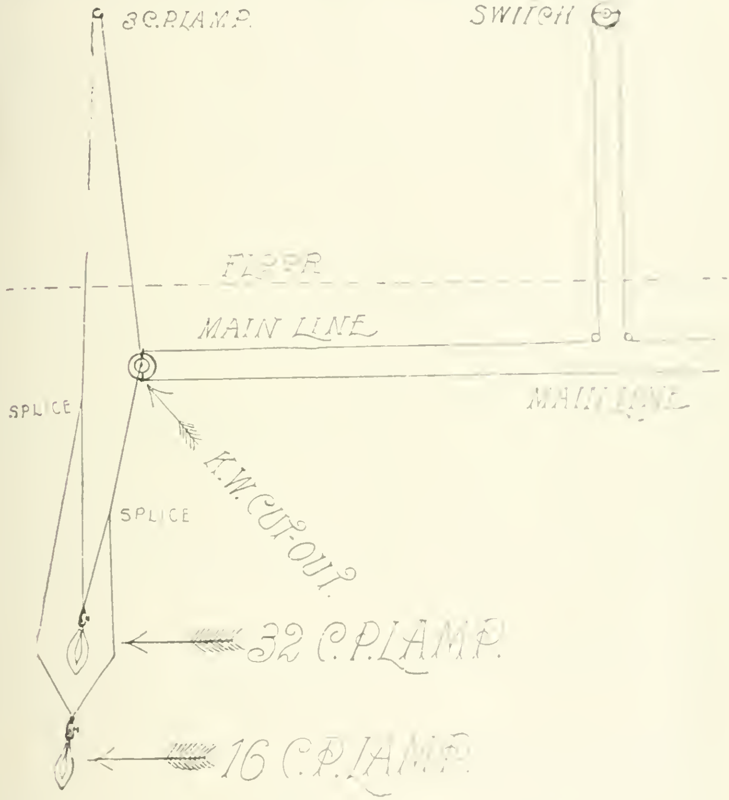

DIAGRAM OF ELECTRIC CIRCUIT.*

*Directions for Wiring.—Wire from one side of K. W. to 3 C. P. lamp sockets; from there to socket of 32 C. P. lamp; returning to the other side of K. W. Tap one side of a socket with one 16 C. P. lamp to the cord running from the 3 C. P. lamp to 32 C. P. lamp, and the other side to the cord running from 32 C. P. lamp to K. W.

In addition to the phorometer and a rotary prism (Crete or Risley), one needs to be provided with a double prism of about six degrees; that are two prisms of six degrees each set base to base in the frame. The one I use was purchased of F. A. Hardy & Co., Chicago; but I suppose they can be obtained from other opticians. Another essential is a red glass; and this every oculist has in his trial case. It is still more convenient to have an oblong piece of red glass five or six inches long and one and five-eighths inches wide, with the edges ground dull.

The next requisite is to understand terms. I am persuaded that while an immense amount has been written on this subject, much of it has not been so clearly expressed as to edify every reader. Neither is the subject so simple as not to need reiteration.

DEFINITIONS.

Orthophoria is the term used to express the normal condition; one in which the balance is correct.

Heterophoria is a generic term which covers all deviations from the normal muscular balance.

Esophoria (abbreviated to Es.), abnormal weakness of the external rectus muscle as compared with the strength of its opponent, causing a tendency to convergence of the optic axes.

Exophoria (abbreviated Ex.) is the term used to express weakness of the internal rectus muscle, causing a tendency to divergence of the optic axes.

Right Hyperphoria (R. H.), weakness of the inferior rectus muscle of the right eye, as compared with the same muscle of the left eye, causing a tendency of the optic axis of the right eye to deviate upwards.

Left Hyperphoria (L. H.) is the opposite condition, and may be considered as weakness of the superior rectus of the right eye, as compared with the same muscle of the left eye, causing a tendency of the optic axis of the right eye to turn downwards.

Some have attempted to be still more exact by introducing the term cataphoria (right and left), of which I believe Dr.

Savage was the originator. The use of this term does away with the necessity of mentioning the word left when the defect may be really in the right eye, and vice versa. The majority of oculists have not yet adopted the term, although it is more technically correct. The use of the double prism and Dr. Herbert's chart makes this subject comparatively plain, and enables one to detect compound errors at a glance. The principal is much the same in either case, for in each one eye is made to show the defects of the other in relation to it. In using Dr. Herbert's test, vertical diplopia is produced by placing a prism of four or five degrees base up in front of one eye, and then watching the positions of the dotted lines.

The plan has already been described in the OPHTHALMIC RECORD, Vol. III, No. 8, p. 324, so I need only refer to it, and to accord it a high place in the study of this interesting subject.

In using the double prism test, triple images are produced; the one belonging to the uncovered eye being between the other two, which belong to the eye covered by the double prism. Thus the picture is just as graphic to the patient in this test, but it is not so easy for the average patient to explain to the oculist what he sees as when Dr. Herbert's test is used; nor can the deviations be reduced to degrees without the tedious use of prisms.

The term horizontal applies to the lateral recti muscles in explaining their balance; and vertical is used in speaking of the superior and inferior recti.

For example, a record reading Es. 3; vert. ortho., would signify that while the internal recti muscles had the advantage of the externi to a certain extent, the balance between the vertical recti muscles was normal.

Cyclophoria is a term proposed by Dr. G. H. Price to indicate insufficiency of the obliques. Of this field, which is rather new, Dr. Savage appears to have full sway thus far, though he claims no monopoly beyond priority of entry.

This must be an exceedingly rare affection *per se*, for in the few cases in which I have found it at all it generally disappeared when I had reached a true correction of the refractive error.

The subject of using prisms for the correction of muscular errors is more interesting than definite. No arbitrary law can be applied to all cases. In general it may be said that many more persons get positive and permanent advantage from the use of prisms on near work than for distant vision; and on the near a prism base in for an exophoria is much more likely to give satisfaction than the correction of a near esophoria. It is generally best to divide the prism strength between the two eyes; but this is not an unvarying rule, as I have found cases in which it was best to have it all retained on the defective eye. Again, the intricacies of modern compound glasses do not always admit of using a prism conveniently to each eye.

Sometimes the effect can be most easily and cheaply arrived at by decentering the lenses. If, however, the prism desired is tolerably strong or there is in the formula a cylinder of considerable strength it is best not to resort to this means of developing the effect of a prism.

If an esophoria is to be corrected by a prism it is accomplished by placing its base out before either the right or left eye, or divided between the two. It should be definitely understood that a small amount of esophoria (say up to two degrees) is not detrimental and does not call for correction. I have seen eyes that were excellent and had never given their owners any uneasiness that show two degrees of esophoria. In fact, my own eyes show about that, and yet I would not think of applying prisms to them because of it, much less listen to any proposition of subjecting them to operation.

Probably the vast majority of esophoria cases get on better without prisms than with. If prisms be used, they should seldom exceed 25 per cent. of the esophoria for distance; and if used on near they should be watched as changes are likely to come quickly.

Exophoria is corrected by a prism base in before either the right or left eye. When I deem it wise to prescribe prisms to correct it for near work I generally correct from 50 to 75 per cent. of the exophoria; seldom use prism base in for distance.

Right hyperphoria is corrected by a prism base down before the right eye, or base up before the left eye.

Left hyperphoria is corrected by a prism base up before the right eye, or base down before the left eye. It is usual to correct about 50 per cent. of the hyperphoria, though I have known it to work well in some instances to correct more.

I consider that every patient should be tested as to his muscular balance both ways. Then it is safest to always test the relative power of the externi and the interni (abduction and adduction); but since "life is short and art is long," we will say that in all cases where there is the slightest doubt upon the subject it should be done; for in certain cases the time that would be thus consumed, and the patient's strength, may be better employed in attending to painstaking refraction work.

I do not regard it as wise to habitually test the dynamic power of the vertical recti muscles where there is no hyperphoria (i. e. in cases of vertical orthophoria).

While the writers who have explained the normal abduction and adduction have done us a service, we must not be led by them into supposing that we are to find such showings in the records of our patients; for be it remembered that most of their eyes have been working at a serious disadvantage. I find that a large percentage of patients have abduction of eight degrees, i. e., can fuse the images when an eight degree prism base in is placed before one eye; and develop an adductive power of say fourteen degrees; while at the same time I am not surprised to find adduction run up to sixteen degrees or even much higher, seldom however going to thirty degrees or above that. If adduction reaches thirty degrees I like to see abduction go up to ten degrees. But it not unfrequently happens that adduction is only eight degrees in a case where the abduction is also eight degrees. If it should prove to be even lower than that and the power of the externi be represented by eight degrees instead of being correspondingly lowered, then the case is one which would arouse suspicion in this direction.

Test work on the near is accomplished by means of the six-degree double prism over the patient's reading formula and a black line with a ball at the middle drawn on a white card; but space will not permit my explaining it here. Any one who desires to familiarize himself with it can do so by procuring Dr. Savage's little book entitled "New Truths in Ophthamology."

The subject of operative work on the ocular muscles is to some extent unexplored territory; but, like the map of Africa, it is undergoing rapid development. Among the most sensible and trustworthy presentations of this subject that I have seen is Prof. Valk's admirable paper in the May number of the OPHTHALMIC RECORD.

Any one who is inclined to drift into hobbyism in the matter of operations should pause and reflect that a first-class refractionist can doubtless by other means cure many cases upon whom a hobbyist would operate. No doubt many foolish things have been done in the name of science by some of those who chose to reach out into this all-but trackless region; but much of the work had been done wisely; and as wisdom is justified of her children, out of this research, sooner or later, definite rules of action will surely be evolved.

THE TREATMENT OF EPIDEMIC CONJUNCTIVITIS OR PINK EYE.

By LOUIS J. LAUTENBACH, A.M., M.D., Ph.D., Philadelphia, Pa.

Surgeon to Pennsylvania Eye and Ear Infirmary; Nose and Throat Physician to Odd Fellow's Home; late Chief of the Eye Clinic of German Hospital, etc.

For years epidemics of pink eye have appeared with us at varying intervals, usually in the spring and fall. That it has not received the needed attention at the hands of the writers on ophthalmological subjects arises probably from the fact that the attacks have usually been mild in type and have displayed no special virulence except in isolated cases. This neglect of the text-book has occasioned a corresponding neglect not only in the general practitioner but in the eye specialist as well. They often fail to thoroughly study these cases and are rather prone to pass over them as unimportant and as curable without treatment. This feeling is furthered by the fact that, in the large majority, the recovery occurs without apparent injury to the eyeball, although the patient often realizes only too soon that damage has been occasioned by the disease.

When, however, we consider the case from the patient's aspect we find that it appears in an entirely new light. For a moment glancing over the progress of an average case, we notice that as the eye becomes congested and inflamed, epiphora and photophobia appear, the latter usually being disproportionate to the severity of the case; the eyes commence to burn and ache; vision for distance, but especially for near, becomes blurred and indistinct; prolonged eye effort is followed by severe pains with increase in discharge of tears and increased photophobia; the head begins to feel full and heavy with marked frontal and temporal aches. Later on the discharge becomes mucous or muco-purulent; the redness and inflammation and the other symptoms increase in severity; and on closely examing the lids, they will show that the papillary layer of the conjunctiva has been affected by the specific poison, the papillary loops being engorged and the swelling simulating in part the appearance of trachomatous granules. As the case progresses still further, the discharges become more profuse and incline more to purulency, while the papillary congestion increases, the corneal conjunctiva becomes somewhat hazy, the photophobia being intense. At this time, the nose usually becomes affected, the discharges being profuse and at times mucopurulent, the nasal mucous membrane intensely red and a general puffiness and swelling of the entire membrane being observed. It will be noticed in connection with these cases that the temperature will indicate a febrile condition, the tongue being coated, the patient inclined to constipation, and symptoms of an exaggerated nervous tension begin to appear. Cases that have progressed thus far, take a long time in their recovery and are prone to leave behind them evidences of the virulency of the disease. We have thus produced cases of chronic catarrhal conjunctivitis, of papillary conjunctivitis and probably of trachoma as well; also disturbances in the muscular balance, especially in the nature of a weakness of the external recti muscles as well as alterations in the refractive condition of the eyes, not only affecting the accommodation but also the corneal curvatures.

Chronic inflammations of the conjunctiva are common resultants, following not only the severer forms but the neglected mild cases as well. This secondary chronic disease often simulates the granular form of conjunctivitis and indeed it seems that occasionally trachomatous conjunctivitis is the resultant of this apparently mild, insignificant catarrhal disease. May it not be that this disease which we are considering is a mild form of the formerly prevalent acute epidemic trachoma, the virus having by modern methods of cleanliness and preventive care, become materially attenuated, the disease being but a shadow of its former self. I have had numerous cases of undoubted trachoma which the patients have insisted commenced with pink eye. I know that I have to-day under observation three cases of pink eye in which the inflammation is persistent, the cases assuming each week more and more of a trachomatous aspect, and in the past I have seen similar cases which have not been restored to health by any means save the knife and the cautery. Of the three cases above noted, one has developed the trachoma-like swelling not alone of the lower lid but on the upper lid as well, all within a space of three weeks. This I have rarely observed. Whenever in trachoma the upper lid becomes affected, invariably there have been similar swellings on the lower lid and on the transitional folds for a prolonged period of time. this swelling seeming to be secondary.

The partial loss of accommodative power is rather frequent but usually lasts for but a week or two, but sometimes it takes months to accomplish a full recovery, indeed I know of cases in which the accommodation has never been restored. Every eye specialist knows that often after such attacks he advises the use of glasses for a greater or less length of time.

I can recall treating some years ago a family of five (father, mother and three daughters) for epidemic conjunctivitis, for all of whom on their recovery I was compelled to order glasses. This with the exception of the father, was their first experience with glasses. Within a year I was able to remove the glasses in the case of the two younger daughters. About two years ago, the oldest daughter had another attack after which I not only was compelled to alter the strength of her astigmatic glasses but to change the axes 15° as well.

The change of the curvatures of the cornea and the consequent alteration in the refractive power of its meridians is not an uncommon result. It is one for which the specialist should be on the watch. A patient who has been wearing glasses previous to such an attack often learns afterwards through the discomfort he experiences that some change must have been caused in his eyeball. Not only will the patient often need a stronger glass but he may require a change in the strength of his cylinder and perhaps a change of its axis. In fact the conscientious physician, after such an attack, will carefully measure the corneal curves and its principal axes and then study by the ophthalmoscope and retinoscope as well as by the visual tests, the refraction and accommodation of such eyes. Using the ophthalmometer constantly in my work, I to-day rarely find a case of pink eye which is not followed by some disturbance of the cornea,—its axes or curvatures, or its nutrition, or perhaps all being affected. In fact a consideration of the intense congestion often present, with a recognition of the fact that the anterior corneal layer is but the extension of the conjunctival epithelium, will make us realize the more readily the occasion for these changes.[1] In addition there is often observable by the eye, but much more readily by the ophthalmometer, an alteration in the constitution of the cornea. A cornea which has been clear and transparent and perfectly reflecting will appear to the observer dull and hazy, and by the ophtholmometer it will be found to be but poorly reflecting and irregular in this respect at various parts. This change has been brought about by an interference with the nutrition of the cornea. It is because of this lack of nutritive supply, occasioned by the pressure of the enlarged conjunctival vessels on the limbus, that the vision is oftenly markedly diminished. I have known cases with a vision of $\frac{6}{6}$ to be diminished to $\frac{6}{12}$? by an ordinary attack of pink eye, and have only succeeded in restoring the vision by favoring a restoration of a vigorous normal corneal nutrition.

It would seem evident from this that the policy of non-interference should be avoided in all cases of epidemic conjunctivitis however mild, and that our methods should be vigorous, thorough and promptly applied. It is a specific disease which often occasions violent symptoms, causing the patient considerable suffering and interfering with his usefulness, and is followed by results which, while not always apparent to the casual observer, are yet markedly detrimental in their effects.

As soon as a patient develops a conjunctivitis, a regulation treatment[2] can be immediately instituted and developments awaited. In this way whether we are dealing with an ordinary catarrhal inflammation, or if it be a phlyctenular trouble, or an epidemic case, or in fact any form of conjunctivitis, the preliminary treatment will be ever the same and will not in any way prejudice the case nor interfere with whatever further treatment may be necessary as the case develops, but will be advantageous directly through its own curative influences. It consists in immediately instilling or spraying into the eye under the lids a three per cent. solution of hydrogen dioxide (in eye work I invariably use that manufactured by the Oakland Chemical Co., as it occasions much less pain than other varieties because it contains but a trace of free acid) being careful that all the conjunctival folds and plicae are thoroughly washed out by it. To do this it is necessary to bring the solution in thorough contact with the mucous surfaces at all its parts, which I accomplish by taking the thumb and index finger, placing the thumb on the lower lid, resting on the malar bone, while the index finger of the same hand is on the upper lid pressing against the supra-orbital ridge, alternately kneading the one and then the other lid. I used the peroxide again and again until the liquid coming from the eye is fairly clear. After this I instill or spray under the lids a saturated solution of boracic acid, preferably warm, and again knead the lids with the thumb and index finger as above described. I use this solution three or four times, each time rubbing the lids over the eyeball. I then evert the lids to examine whether the applications have been sufficiently thorough. If not I repeat the process, but if satisfactory, I then proceed to further treatment using such remedies as the disease demands.

As stated before, the above is my primary or preliminary treatment for all cases of conjunctivitis and it has the marked advantage of being not only curative in itself but also of thoroughly cleansing the conjunctiva so that medicines afterwards applied reach not only the superficial layers but affect even the papillary structures. The minutest crevices and fissures are cleansed and the intercellular spaces which had been packed full of detritus now allow of the ready passage of our curative solutions. The effect of a caustic, and astringent, or an emollient on a surface so prepared is not only more prompt but far more efficacious than when applied in the ordinary manner. Slowness of progress, the cause of so much dissatisfaction, is by this means very often avoided.

In regard to the further treatment of epidemic conjunctivitis, I invariably, if the case be not convalescent, use a solution of nitrate of silver, usually of from five to ten grains to the ounce, sometimes as much as thirty grains to the ounce, thoroughly applied by an applicator wound with cotton, to every part of the conjunctiva in the least affected, paying special attention to the tarsal surface and palpebral folds which I bring into view by everting the lids, using the neutralizing salt solution only when I fear that an excess of the nitrate may have been used. After this application I again cleanse with boracic acid solution and often instill four or five drops of bland sweet oil or castor oil to soothe the roughened and sensitive conjunctiva. I invariably make these applications myself and insist upon doing it daily. As the case improves I use weaker solutions of nitrate of silver or substitute solutions of sulphate of copper or of zinc. For his home use I direct that his eye be washed thoroughly every hour with a warm saturated solution of boracic acid and if the case be at all severe I direct one drop of a one-grain-to-the-ounce solution of nitrate of silver to be used in the eye at the outer canthus three times a day; if the mildness of the case do not justify this treatment, I substitute the sulphate of copper solution, one grain to the ounce, to be used in the same manner.

Should there be much pain, or should the swollen capillaries of the papillary layer cause much irritation, I order a weak solution of cocaine to be used as necessary. Should there be a tendency to blepharitis or to eczema, I usually prescribe yellow oxide of mercury ointment, one grain to the ounce, or use an ointment of one part ung. picis to seven parts ung. zinci oxidi.

For the photophobia I not only use smoked glasses, which should be constantly worn by every pink eye sufferer, but advise frequent bathing of the eyes with hot water; and occasionally I use a little eserine with my cocaine solution.

In some cases where the tendency to the formation of adenoid tissue seems pronounced I use the alum stick daily until there is a subsidence of the swelling and an amelioration of the congestion.

By vigorous insistence upon the measures above outlined, I feel sure that the chronic disturbances of the conjunctiva as well as the prolonged interference with the innervation of the cornea will usually be avoided, the attacks will be shorter in duration and less violent, the patient will suffer less pain and inconvenience and less often than is common, will the eyes be left weak and irritable after such attacks. Glasses will not be ordered as often nor will they be changed as frequently as when the attacks are prolonged by reason of neglected or insufficient treatment.

Another matter on which I have as yet not touched, but which is of some concern, is the management of the eyes so that, first, the other eye does not become affected, and second, the avoidance of the contagion's extension to the patient's family and his business associates.

It is almost impossible to avoid infection of the good eye, yet occasionally by thorough and severe treatment of the affected one, combined with rigid cleanliness and care, we can succeed in limiting the disease to but the one eye. To prevent infection I do not close the eye with a watch glass or adhesive plaster, but direct the patient to avoid sleeping on the unaffected side, preferably to lie on his back, and to invariably wash the good eye with a saturated solution of boracic acid, before he washes the affected one, while continuing with the treatment as above outlined.

It is far easier to prevent the infection's spread among the patient's family and his associates. Extreme cleanliness, and care to avoid greeting his friends too affectionately, are most efficient remedies. The contagion is undoubtedly transmitted by the eye discharge only. In consequence, extreme care should be used in cleansing handkerchiefs, towels and all clothing that may have been used by the patient, and destroying all cotton and other applications used in the treatment of such an eye.

Summing up in a few words:—I believe in treating the eye in such manner as to get rid of all infecting materials or debris, and then to apply astringents or caustics sufficiently strong to overcome the morbid process, while at the same time easing the painful symptoms. In addition use care and cleanliness to the uttermost, to avoid, first, the infection of the good eye, and secondly, to prevent its spread to the patient's friends and companions.

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[1] These changes are considered more at length in a paper, "On the Local and General Conditions that Change Corneal Curvatures." Journal of American Medical Association, November 23. 1895.

[2] "The Treatment of the Various Forms of Conjunctivitis as Practised at the German Hospital." Proceedings County Medical Society, 1893.

CONCERNING THE EXTRACTION OF IMMATURE CATARACT, WITH THE REPORT OF CASES.*

By G. E. DE SCHWEINITZ, M. D., Philadelphia, Pa.

Practically all ophthalmic surgeons are agreed that about the sixtieth year the lens may be extracted safely, even if it is in part unclouded, because, if Schweigger is correct, at that period of life the usual criteria of ripeness are erroneous, accommodation being annulled by physiologic changes in the lens. Whether we may with equal propriety extract immature cataract in younger individuals, is still a matter of dispute, and it is much to be desired that some rational and safe procedure may be devised to relieve the patient from the long period of semi-blindness, which often exists while a senile cataract is slowly advancing to maturity. Not only is this stage present in senile cataracts, but also in other types of opacification of the crystalline lens, namely zonular cataracts, immature traumatic cataracts, and the partially formed cataracts in young people.

Recently, this subject has been discussed at some length by Dr. John E. Weeks in a paper entitled "The Operative Treatment of Immature and Some Forms of Zonular Cataract," which was presented to the Baltimore meeting of the Ophthalmologic Section of the American Medical Association. Twenty-five cases, without a failure, were reported, and the results appeared to this writer to be as favorable as those ordinarily obtained by the removal of cataract at the stage of maturity.

It is interesting to note one or two of the comments on this paper. Knapp, for example, refers to the fact that the ripening operation unfortunately is often done without effect, often provokes iritis, and has even been followed by plastic and purulent irido-cyclitis. He, therefore, if patients will not wait, prefers the risk of dealing with the remnants by secondary discission to the double operation of ripening and extracting the lens. Hotz, of Chicago, describes his experiences with ripening processes as unsatisfactory, either because the lens did not ripen, or because his efforts were followed by cyclitic irritation, and concludes that the extraction of immature cataract does not involve greater danger than the removal of a fully mature cataract, provided there is not a very large amount of absolutely transparent lens matter. When this is the case, the patient's vision is usually still so good that there exists no urgency for an operation. Not a little interesting are the remarks of Dr. White, of Richmond, who, as we all know, is a strong advocate of one form of ripening operation. He says: "I never ripen immature cataract if the case will wait for nature's processes, and then only if the patient is under sixty years of life, because I thereby break up and loosen the cortex from the capsule, simplifying the extraction; over sixty years of age, I extract without waiting for maturity."

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*Read before the Philadelphia County Medical Society, March 11, 1896.

First, concerning the ripening of cataracts.

I have taken the liberty of introducing this subject in the hope that it may elicit discussion from my colleagues, and not in any sense to bring forward new views or new methods. My own experience with ripening consists in the performance of one or two operations: either the Foerster method, or, in a few instances, the method which is particularly advocated by Boerne Bettmann, of Chicago, namely, direct massage of the lens capsule. I have not performed either of the operations many times, and thus far have no bad results to record; perhaps because my experience is a limited one. I have, however, seen extremely bad results in the hands of others, not only from primarily induced iritic and cyclitic complications, but also where the ripening process proceeded smoothly, but at the extraction the capsule was found thickened, the cortex clinging tenaciously, and the toilet of the wound much more difficult than would have been the case had the cataract been extracted in its immaturity.

Second, concerning the method of extracting an unripe cataract.

Knapp, Weeks and other operators of skill and experience, employ the simple extraction, precisely as they would for an uncomplicated mature cataract. In all my cases of unripe cataract I have used the combined method, sometimes with a preliminary iridectomy, with the exception of one instance, in which I did simple extraction. I have preferred iridectomy because it has seemed to me that prolapse of the iris, from the danger of which the best operator is not free, added to the increased danger of cortical remnants, multiplied unnecessarily the risks of the patient, and moreover, that the toilet of the wound was more easily accomplished. Perhaps with wider experience and increased skill, my opinion on this subject may change. Certainly the experience of Weeks indicates that simple extraction is satisfactory.

Third, concerning the opening of the capsule.

Theoretically, peripheral opening of the capsule, and therefore confining cortical remnants, is the proper procedure. Practically, with the exception of one case, I have always freely opened the capsule by a T-shaped flap, and usually, immediately at the conclusion of the operation, have instilled a drop of sterilized atropine solution. I have avoided iritis, except in one instance. In this case, however, there was trauma during the process of healing.

Fourth, concerning irrigation of the anterior chamber.

I believe this to be a dangerous procedure and never employ it. Occasionally in clearing the wound, I have made slight pressure on the sclera above the corneal section with a sterile spatula, and allowed my assistant to flood the wound edges with a tepid boric acid solution, or a sterile normal salt solu-

No.	Sex	Age.	Health	Cataract	Date.	Operation	Recovery	Immediate Vision.	Secondary Operation	Ultimate Vision.	Remarks
1	M	58	Chronic alcoholic	Immature senile V. = counting fingers.	1. 18. 90	Preliminary iridectomy in March, 1889. Extraction 1. 18. 90. Some cortical remnants in coloboma.	Uneventful	Counting fingers.	6. 6. 91, three discissions.	Counting fingers.	Small atrophic disk; shrunken arteries; patient able to get about. clear coloboma.
2	F	40+	Feeble	Immature nuclear. V. = fingers at 1 foot	5. 17 95.	Preliminary iridectomy, 12 14. 94 Extraction, 5. 17 95	Uneventful; small prolapse of inner pillar of coloboma	$\frac{5}{30}$. 23 days.	No discission	$\frac{6}{20}$	Patient highly myopic; correcting lens + 1; many vitreous opacities, huge posterior staphyloma and myopic choroiditis.
3	M.	66	Good	Immature senile. V. = fingers at 1 meter	10. 4 95.	Preliminary iridectomy in Brooklyn two years ago; extraction, 10. 4. 95; clean delivery of lens.	Uneventful	$\frac{6}{30}$. 20 days.	Dec., 1895	$\frac{6}{18}$	Old corneal macula; clear coloboma a few slight vitreous opacities
4	F	75	Good	Immature senile. V. = fingers at 6 inches	11 7 95.	Combined extraction, clean removal of lens, thick capsule	Traumatic hemorrhage into anterior chamber on fourth day; slight iritis.	$\frac{6}{15}$. 22 days.	Not yet performed.	-	Several posterior synechiæ; capsule thick
5	M.	74	Good	Immature senile	11 9. 95.	Combined extraction. 3 mm. flap some cortex remaining	Uneventful	$\frac{6}{30}$. 12 days.	Declined	$\frac{6}{10}$	Some cortex remaining in wound patient left hospital 12 days after extraction; extraction in opposite eye of ripe cataract 2 weeks previously, v. = $\frac{6}{12}$ without discission.
6	M.	58	Good	Immature nuclear V. = $\frac{2}{60}$	11 11 95.	Preliminary iridectomy, 6 10. 95; extraction of lens, 11. 11. 95, much cortex remaining	Uneventful	$\frac{6}{24}$	[illegible] 6. 96	[illegible]	Tension soft. thick capsule remaining, but after discission large clear space through web
7	F	40+	Feeble	Immature nuclear V = counting fingers at 2 feet	11 20 95.	Preliminary iridectomy, 6. 3 95 extraction 11, 20 95	Uneventful	$\frac{6}{30}$ 33 days.	No discission	$\frac{6}{27}$	High myopia; posterior staphyloma and extensive retino-choroiditis vitreous opacities; is able to sew with + 4.50, several bands of capsule above and below with clear space between
8	M	58	Good	Immature nuclear V. = counting fingers	12 2 95	Preliminary iridectomy, 6. 28. 95 lens extracted. 12. 2 95.	Uneventful	$\frac{5}{27}$ 18 days.	Jan. 1896	[illegible]	Tension of the eye soft; two small bands of capsule remaining across pupil.
9	M	27	Albuminuria	Immature soft V. = fingers at 1 meter	12. 16 95	Simple extraction Knapp's section	Prolapse of iris. restoration under eserin on sixth day	$\frac{5}{15}$. 14 days.	Discission, 1 16. 96	$\frac{6}{9}$	One strand across pupil fundus easily seen and normal
10	M	65	Chronic bronchitis	Immature senile V. = counting fingers at ¼ meter.	1 28 96	Combined extraction, some cortex remaining in coloboma	Patient very restless; anterior chamber remained open for five days	$\frac{6}{20}$; 14 days. $\frac{6}{15}$: 6 weeks.	Discission, 3. 19. 96	$\frac{6}{9}$	Clear pupil
11	M.	40	Good	Immature traumatic: v = l p	4. 25. 94	Small corneal flap, with iridectomy; considerable cortex remaining	Uneventful	Counting fingers at 1 foot. 10 days.	Declined.	$\frac{6}{12}$	Cortex gradually absorbed, leaving some thickened capsule blocking the coloboma, which contained several small openings; 10. 10. 94, v. = $\frac{6}{12}$? Patient seen one year later, and v. had declined to $\frac{3}{60}$, owing to thickened capsule; declined discission.
12	F.	40	Good	Immature senile. V = counting fingers; lens slightly swollen.	2. 12. 96.	Combined extraction; a large piece of cortex remaining.	Uneventful	-	-	-	Patient under her physician's care, who reported gradual absorption of the cortex, and the pupil now quite clear, 3. 6 96. Glasses not yet ordered; patient attending to

[illegible], of Pittsburg, who practices irrigation as a routine matter, but I am not inclined to burden the extraction of cataract with an additional manipulation when equally good results are obtainable without its use.

In the accompanying table I represent twelve cases in which I have extracted cataract which was immature. Four of these were immature nuclear cataracts, six immature senile cataracts, one immature soft cataract, and one immature traumatic cataract.

The immature soft cataract was removed by simple extraction and the ultimate vision was $\frac{5}{5}$. In all of the others iridectomy was performed, in five of them preliminary iridectomy, four times by myself, and once by another surgeon. The recovery in all was uneventful, with the exception of one, in which a traumatism on the fourth day produced a hemorrhage into the anterior chamber, with subsequent iritis, the vision, however, being $\frac{6}{12}$, which an ultimate discission, not yet performed, will doubtless raise to a higher standard.

Two of the cases are interesting as presenting the extraction of immature cataract in high myopia, a myopia of not less than eleven diopters, and associated with extensive atrophic myopic choroiditis.

In six of the cases subsequent discission was performed, in two it was declined, in one it has not yet been performed, and in the remainder it has been unnecessary.

In two patients the vision was normal, in three one-half of normal, in two two-fifths of normal, in one one-fifth of normal, and in two one-sixth of normal. In one the vision is good (the patient has not yet been tried with glasses), and in one the vision was counting fingers, the patient being able to move

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3	M.	66	Good	Immature senile. V. = fingers at 1 meter	10. 4 95.	Preliminary iridectomy in Brooklyn two years ago; extraction, 10. 4. 95: clean delivery of lens	Uneventful	$\frac{6}{30}$. 20 days.	Dec., 1895	$\frac{6}{18}$	Old corneal a few sligh
4	F	75	Good	Immature senile. V. = fingers at 6 inches	11 7 95.	Combined extraction, clean removal of lens, thick capsule	Traumatic hemorrhage into anterior chamber on fourth day; slight iritis.	$\frac{6}{18}$. 22 days.	Not yet performed.	-	Several post thick
5	M.	74	Good	Immature senile	11 9. 95.	Combined extraction. 3 mm. flap some cortex remaining	Uneventful	$\frac{6}{30}$: 12 days.	Declined	[illegible]	Some corte patient le extractio eye of rip ously, v.
6	M.	58	Good	Immature nuclear V = $\frac{2}{20}$	11 11 95	Preliminary iridectomy, 6. 10. 95; extraction of lens, 11. 11. 95. much cortex remaining	Uneventful	$\frac{6}{24}$	· 6. 96	[illegible]	Tension so ing, but a space thr
7	F	40 +	Feeble	Immature nuclear V = counting fingers at 2 feet	11 20 95.	Preliminary iridectomy, 6. 3 95 extraction 11. 20 95	Uneventful	$\frac{6}{30}$ 33 days.	No discission	[illegible]	High myop and ext vitreous with + 4 sule abo space be
8	M	58	Good	Immature nuclear V. = counting fingers	12 2 95	Preliminary iridectomy, 6. 28. 95 lens extracted. 12. 2 95.	Uneventful	$\frac{6}{24}$ 18 days.	Jan. 1896	[illegible]	Tension o bands of pupil.
9	M	27	Albuminuria	Immature soft V. = fingers at 1 meter.	12. 16 95	Simple extraction Knapp's section	Prolapse of iris: restoration under eserin on sixth day	$\frac{6}{15}$: 14 days.	Discission, 1 16. 96	[illegible]	One stra easily s
10	M	65	Chronic bronchitis	Immature senile V. = counting fingers at ½ meter.	1 28 96	Combined extraction, some cortex remaining in coloboma	Patient very restless; anterior chamber remained open for five days	$\frac{6}{20}$: 14 days. $\frac{6}{18}$: 6 weeks.	Discission, 3. 19 96	[illegible]	Clear pup
11	M.	40	Good	Immature traumatic · v = 1 p	4. 25. 94	Small corneal flap, with iridectomy; considerable cortex remaining	Uneventful	Counting fingers at 1 foot; 10 days.	Declined.	$\frac{6}{12}$	Cortex g some t the co severa v. = later, owing clined
12	F.	40	Good	Immature senile. V = counting fingers; lens slightly swollen	2. 12. 96.	Combined extraction; a large piece of cortex remaining.	Uneventful	-	-	-	Patient who r of the quite yet or

Large type had to be used and then this table had to be reduced by photo-engraving. The small figures in column 11 show so indistinctly that this slip had to be made, to show them well.

	Ultimate Vision.
(1)	Counting Fingers.
(2)	$\frac{5}{30}$
(3)	$\frac{6}{15}$
(4)	$\frac{6}{12}$
(5)	$\frac{6}{30}$
(6)	$\frac{5}{10}$
(7)	$\frac{5}{30}$
(8)	$\frac{5}{10}$
(9)	$\frac{5}{5}$
(10)	$\frac{6}{6}$
(11)	$\frac{6}{12}$

tion, but I have never, in recent times, injected these fluids into the chamber. I am well aware that surgeons with large operative experience report most satisfactory results from irrigation of the anterior chamber, particularly Lippincott, of Pittsburg, who practices irrigation as a routine matter, but I am not inclined to burden the extraction of cataract with an additional manipulation when equally good results are obtainable without its use.

In the accompanying table I represent twelve cases in which I have extracted cataract which was immature. Four of these were immature nuclear cataracts, six immature senile cataracts, one immature soft cataract, and one immature traumatic cataract.

The immature soft cataract was removed by simple extraction and the ultimate vision was $\frac{5}{5}$. In all of the others iridectomy was performed, in five of them preliminary iridectomy, four times by myself, and once by another surgeon. The recovery in all was uneventful, with the exception of one, in which a traumatism on the fourth day produced a hemorrhage into the anterior chamber, with subsequent iritis, the vision, however, being $\frac{6}{12}$, which an ultimate discission, not yet performed, will doubtless raise to a higher standard.

Two of the cases are interesting as presenting the extraction of immature cataract in high myopia, a myopia of not less than eleven diopters, and associated with extensive atrophic myopic choroiditis.

In six of the cases subsequent discission was performed, in two it was declined, in one it has not yet been performed, and in the remainder it has been unnecessary.

In two patients the vision was normal, in three one-half of normal, in two two-fifths of normal, in one one-fifth of normal, and in two one-sixth of normal. In one the vision is good (the patient has not yet been tried with glasses), and in one the vision was counting fingers, the patient being able to move about. The poor vision was due to alcoholic atrophy of the optic nerve, which was present before the extraction of the cataract. The two cases with one-sixth of normal vision are the cases of high myopia before referred to, and considering the extensive lesions of the fundus, this result is excellent. The case with one-third of normal vision, declined discission, which would certainly have raised the acuity of sight; of the cases with two-fifths ($\frac{6}{15}$) of normal, one has an old corneal macula, and the other has not as yet submitted to a needed discission.

The ages of these patients varied from 27 to 75; four of them had reached that age in which, to quote the sentence in the beginning of this article, "the ordinary criteria of ripeness" need not be regarded and the lens may safely be extracted. The others were under this age.

The health of seven of these patients was good; in two it was feeble; one had albuminuria, one chronic bronchitis, and another was a chronic alcoholic with atrophy of his optic nerves.

I have not included in this list several other cases which properly belong here, chiefly for the reason that I do not know exactly what the final outcome was. One, for example, was a case of partially formed cataract, the probable result of an injury. The lens was extracted and the healing kind. The patient, however, left the hospital without permission, some cortex remaining in the coloboma, and never subsequently reported. There is no record of the vision other than that he could see to tell time on the face of a watch. In another very interesting case, which I reserve for a separate publication, there was a degenerated lens, also the result of traumatism, which I extracted in its entirety with capsule forceps, but not without loss of the vitreous, the ultimate vision, however, being very good. I have not included in this list those instances, with which we are all familiar, in which, although the lens comes out cleanly, it is yet an unripe lens; lenses, in other words, which never reach full maturity, or, at least, never reach the condition of perfect opacification.

If I were to sum up my belief in regard to the extraction of immature cataract, I would say with Knapp, with White, and I suppose with all surgeons, that I prefer always to wait for maturity, or for that time of life when the lens, even though immature in the ordinary sense of the term, will cleanly leave its capsule. But I prefer the extraction of immature cataract (combined section) to the performance of an operation for ripening. I perform preliminary iridectomy if functional examination determines that there are complicating circumstances, as, for example, in the cases of high myopia, and in two of my cases of immature nuclear cataract in which the tension of the eyeball was diminished and there was tremulousness of the iris, indicating probable vitreous changes.

CONCERNING THE REPAIR OF CORNEO-SCLERAL WOUNDS, WITH PROLAPSE OF THE IRIS.*

By G. E. DE SCHWEINITZ, M.D., Philadelphia, Pa

For practical purposes prolapse of the iris occurring at the corneo-scleral junction, or its immediate neighborhood, may be divided into those varieties which result from a perforating ulcer and those which follow a wound, either accidentally inflicted or designedly placed, as, for example, in the corneal section of cataract extraction.

The treatment naturally consists of two procedures: non-operative, *i. e.*, the use of eserine and a pressure bandage; and operative, viz., abscission of the prolapse and closure of the wound. It is to the best method of dealing with these cases from the operative standpoint that I desire to call attention, in the hope of eliciting some discussion from my colleagues present to-night.

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* Read before the Philadelphia County Medical Society, March 11, 1896.

First, the method of Gama Pinto for obtaining a non-adherent cicatrix.

As is well-known, this surgeon abscises the prolapsed portion of the iris, frees all adhesions to the margin of the ulcer, and covers the opening in the cornea with a flap of bulbar conjunctiva, which should be cut twice as large as the opening and pushed into the orifice with a blunt probe. A firm binocular bandage is applied and the eye not dressed until the third day. Then it will often be found that the conjunctival flap has healed into the ulcer. A flat, non-adherent cicatrix results, or, in other words, an ordinary corneal scar without staphylomatous bulging, and a circular pupil.

I have employed this method several times and with gratifying success, although I have not always been able to secure non-adherence of the iris to the cicatrix.

For example, a patient now in the Philadelphia Hospital, several years ago was admitted with a large marginal ulcer occupying the entire upper and outer portion of the cornea, which had perforated in one corner and permitted the prolapse of a large portion of the iris. This was abscised in the usual way and the Gama Pinto directions followed. It was an unfavorable case owing to the extent of the ulcer and the shape and character of the opening, which followed the curve of the cornea for some distance. At present, fully six years after the accident, the point of prolapse is occupied by a perfectly flat white cicatrix, to which there is slight adherence of the iris, so that the pupil is drawn upward and outward. The vision of the eye is excellent and the patient has no trouble with it, being able to sew the entire day—a result, considering the extent of the ulceration and prolapse, far better than was to be anticipated.

In another case, which I have recorded briefly in the *Philadelphia Polyclinic*, the patient suffered from monolateral gonorrhea[1] conjunctivitis, complicated with sloughing ulcer at the inferior portion of the corner, perforation, and a large prolapse of the iris. The iris was abscised, the margins of the aperture carefully cleansed, and the iris freed as much as possible. The opening was then closed with a flap of conjunctiva *transplanted from the other eye*, the size of the flap being almost that of the circumference of the cornea, or, in other words, fully three times the size of the original opening. The result was admirable; the graft became adherent, there was no bulging, or very little protrusion of the cicatrix, although the iris was somewhat adherent and the pupil distorted. Vision was about one-seventh of normal—far better than could possibly have been expected from the serious nature of the lesion and the extensive prolapse of the iris. He returned after nearly three months and the following note was made: Graft covering lower third of cornea. Vessels from conjunctiva pass over gaft. Pupil partially covered. Vision, fingers at two meters, without correction.

Should the method of Gama Pinto fail to secure a non-adherent cicatrix, after the healing had become firm, there would be no objection to the performance of Mr. Lang's operation of dividing the anterior synechiæ with a blunt knife-needle—a procedure which I have practiced in a number of instances with almost universal success.

The advantage, then, of the Pinto flap, even if non-adherence of the iris is not secured, consists in a more rapid healing of the corneal wound, together with the prevention of staphylomatous bulging.

Second, the closure of the wound with stitches.

The report of a few cases will illustrate this method:

Case 1.—A male, aged eighteen years, was admitted to the wards of the Philadelphia Hospital on May 11, 1895, with violent bilateral gonorrheal conjunctivitis. The right cornea was still clear; the left cornea had already begun to be opaque.

In spite of treatment, on the left side there was rapidly formed a large corneal abscess, and on the right side, nine days after admission, a large crescentic ulcer formed at the upper and outer corneo scleral junction, which speedily perforated, permitting a huge prolapse of the iris. It was impossible to make pressure, owing to the inflamed conjunctiva; eserine was tried without effect, the prolapse and staphylomatous bulging becoming greater each day.

Therefore a week after the appearance of this prolapse it was abscised (the discharge from the conjunctiva had almost ceased, although the membrane was still vascular), the edges of the wound freed as much as possible, and the iris replaced with a spatula. The corneal and the scleral edges, if I may so express myself, of the wound which occupied the upper and outer third of the corneal rim, were now freshened and united by four sutures. The sutures were removed on the fourth day, and the wound found firmly united. When my term of service ended, six weeks later, the vision was $\frac{20}{50}$ without correction, the media clear, the pupil slightly oval and drawn upward and outward and the eye quiet, although there was still some thickening of the papillary layer of the conjunctiva, owing to the previous conjunctivitis. The vision of the left eye was counting fingers, owing to the presence of a central corneal macula.

Although not bearing upon this topic, it is interesting to note that this patient during his attack of gonorrheal conjunctivitis successively developed synovitis of all the large joints, beginning with the left knee. With each attack of synovitis there was marked exacerbation of the corneal symptoms, and it was during the attack of synovitis in the left knee-joint that the perforating ulcer which I have described appeared. I have never before seen so extensive a case of gonorrheal synovitis.

Cale II.—A female child, aged twelve years, came for treatment to the Jefferson Medical College Hospital on December 27, 1895, presenting at that time, according to the records, a phlyctenular kerato-conjunctivitis, with ulcer at the inferior margin of the cornea. The ulcer must have gone on to perforation, and when I came on duty, on the 13th of January of the present year, there was a large prolapse of the iris, with beginning staphylomatous bulging.

On the 17th of the same month the prolapsed iris was excised, the edges of the wound freshened and closed with a silk suture, after replacement of the iris.

The suture was removed on the third day, and recovery has been uninterrupted; the eye, previously irritable and congested, rapidly became white and quiet, and now the opening is closed by a firm white cicatrix, without bulging, the pupil is nearly circular, although there is some attachment of the iris below, and the vision with the best correcting glass is $\frac{20}{40}$.

Case III.—Kate Ingram, aged fifty, an insane patient in the Philadelphia Hospital, was admitted to the Ophthalmic Wards with double cataract. Both lenses were extracted without iridectomy. In the right eye there was kind healing, without accident; in the left eye a large prolapse of the iris was found twenty-four hours after extraction. It was treated in the usual method by the instillation of eserine and a compress bandage, and somewhat lessened in size.

Three weeks after extraction the prolapse was abscised, the iris replaced as much as possible, and the wound closed with two silk sutures which were removed on the fourth day. The healing was perfectly kind; the pupil, instead of being round, is a vertical oval, and the vision on February 1st, after the correction of six diopters of astigmatism is $\frac{6}{20}$. This astigmatism will very much decrease in the course of time, and no doubt there will be corresponding improvement in vision.

I will not occupy more time with additional clinical histories, as these are sufficient to illustrate the class of cases to which the procedure is suited, namely, wounds and ulcers at or near the corneo-scleral junction, associated with prolapse of the iris, in which, after removal of the prolapsed iris, it is possible to secure perfectly clean corneal wound-edges. I would prefer not to pass a stitch if the margin of the wound was infiltrated or gray. I would also hesitate about passing a stitch if a wound at the same time had injured the ciliary body.

It seems to me that the method of Gama Pinto is preferable if the opening is distinctly circular, and if it is not possible to obtain a perfectly non-infiltrated wound-edge without destroying too much corneal tissue, as, for example, in the case of monolateral gonorrheal conjunctivitis, with perforating ulcer. If, after abscission of the prolapsed iris, the wound is elliptical, or follows the curve of the cornea, as, for example, in Case I, stitches seem preferable to a graft.

I have not as yet excised the ulcerated tissue of a large corneal ulcer and then stitched the edges of the wound, but I am inclined to try it. Neither have I stitched wounds situated at some distance from the edge of the cornea.

Corneal sutures are inserted as a rule by some cataract operators after the simple extraction, for example, by Kalt, in France, who is a strong advocate of this procedure. So, also, a number of operators have advocated the insertion of these sutures after the abscission of a prolapsed iris subsequent to simple extraction.

The point of this matter evidently is that we are able to insert delicate sutures in the cornea with more impunity than we would be led to believe from the ordinary text-book descriptions of these lesions. I have always used delicate silk thread and the curved needle which comes in Dr. Stevens' tenotomy case. I have not tried catgut, and do not believe it would be as satisfactory as the silk.

THE MEDICO-LEGAL ASPECT OF EYE CASES.

J. WALTER PARKS, M.D Harrisburg Pa.
Late Clinical Assistant Royal London Ophthalmic Hospital, London, England, Ophthalmic Surgeon, Harrisburg Hospital, Childrens' Industrial Home, Home of the Friendless, etc

The subject chosen for my paper is one of special interest to me, and I feel assured it will be so to the general practitioner, if I succeed in impressing upon your minds the necessity of a certain professional relationship which should exist between the general practicing physician and the specialist, in the examination and treatment of accidental eye injuries, preparatory to what may become, medico-legal cases. The subject is an extensive one and I will confine my remarks more particularly to accidental injuries. I wish to call attention to the following points of interest. First, the kind of examination, and record of the case, that should be made by the physician in attendance at the time of the injury. Second, the kind of cases which should be examined by a specialist, or one skilled in the treatment of diseases and injuries of the eye. Third, some of the requirements that are a necessity to the general physician and specialist in medico-legal cases, and their advantages to the plaintiff and defendant in suits for damages.

To illustrate the first division of my subject, I will cite a case which answers almost every point I wish to impress upon you, as regards the kind of examination, record, etc., that should be made in such cases. In October, 1892, I was sent by a railroad company to examine the eyes of Mrs. S., who one year and three months previously had been in a wreck on their road, and claimed that her present defective vision was due to injuries received at that time, and as a result brought suit against the company for damages. A careful examination of the fundus of each eye revealed dense opacities in the vitreous humor of both eyes, and on account of their density, no good view of either fundus could be obtained; yet to me it evidently was a case of disseminated choroiditis, which is often the cause of these opacities and diminution of vision. Hemorrhage into the vitreous may also cause similar results: this the defense claimed was the cause, and was due to the blow she received when the car turned over. The attending physician had not made an ophthalmoscopic examination of either eye at the time of the accident, hence could not say what the interior of the eye looked like, whether any hemorrhages were present or not, but the patient claimed that from that time on her vision was impaired, and the jury awarded her damages accordingly. Had a careful ophthalmoscopic examination been made at the time of the accident, as should have been done, and had a full record of the case been kept, either by the physician in attendance, or by a specialist, the opacities in the vitreous I think, would have no doubt, been discovered there then, and the verdict would have, no doubt, been the reverse. This case shows conclusively that, in accidental cases involving the eye or its appendages, a careful history of the patient should be taken, a minute examination of all the injured parts should be made, notes of a careful ophthalmoscopic examination should be kept; and if the attending physician is not competent to do this, the patient should be sent to one who is competent, or a skilled man sent to see the patient at his own home, and it should be done immediately.

Second, I think that all accidental injuries involving the eye ball, cornea, iris and lens, fractures of the orbit, or when the vision of your patient may be impaired in any manner whatsoever, from intra-ocular as well as extra-ocular injuries or diseases, the physician in charge should have in consultation a specialist, unless he is himself, capable of attending in a skillful manner. As previously mentioned, the consultant should be called in immediately after the occurrence of the accident; this would be for the benefit of the patient, as well as for any future legal complications that might arise. Take nothing for granted, be sure you are doing all you can for your patient's welfare, as well as for all parties concerned. A large sum of money may be due your patient for injuries sustained in an accident, or a like amount may be unjustly demanded of a corporation, especially when the cause of the alleged injuries existed prior to the accident. This can only be determined intelligently by a careful examination at the time of the occurrence of the alleged injuries. A case with a severe neuralgia of the superior maxillary nerve, which at times involved the ophthalmic branch distributed to the eye, was sent to me by a prominent attorney, who claimed damages against a borough for alleged negligence on their part in not keeping the street crossings clear of snow and ice, his client had slipped and fallen, crushing in the malar bone, injuring the nerve, and causing a chronic neuritis of the superior maxillary, with some pain in the ophthalmic branch, which occasionally caused him some pain in his eyes, but had not in the least affected his vision. This accident occurred over a year previous to the plaintiff's bringing suit for damages, and at the time the case was sent to me, almost two years after the accident, the claimant had perfect vision, with his error of refraction corrected with lenses, very seldom any pain in his eye, and I could not discover any trace of impairment of vision in any manner whatsoever. This man wanted me if possible, to discover something wrong with his eyes, so he could demand a larger sum of money when he instituted his suit for damages. No careful examination was made at the time of the accident, no records kept, and as a result no definite testimony could be procured either for the plaintiff or defendant. Cases are rare indeed, where accurate and full records are kept, and yet we are constantly seeing them. Let us try at least to show professional skill in these cases, so that we may appear as experts, and not as mere figure heads, when summoned before a court of justice.

Third, the requirements of the physician and specialist in a court of law in eye cases, from a medical standpoint, are so numerous and complicated, that I can but refer to a few of the more important ones.

First of all, you should thoroughly understand the anatomy and physiology of the eye, so that you can intelligently answer all questions relative to injuries of these parts. You should be familiar with the use of the ophthalmoscope, be able to use it, and differentiate a diseased eye-ground from a normal one. It is well to know the general appearance of interstitial keratitis, and that it is only syphilis, be it hereditary or acquired, that will produce that characteristic condition of the cornea, which when once seen is never forgotten. You should know how to treat them properly, and perhaps save your patient from becoming blind, and yourself from being sued for malpractice. We should know something about such cases, or else send them to some one who does, and then we assume no responsibility. Be careful to state the probable results, be they good or bad; make no promise of good recoveries, or as to length of time of treatment required, for if you do, and your promises are not realized, but on the contrary your patient gets blind, and if you are "unfortunately" worth considerable money, you may lose it by paying damages and attorney's fees. This duty we owe to ourselves as well as to our patients. An intelligent community demands it of us, and if we heed not the warning, we must suffer the consequences. When on the witness stand, answer only such questions as you are obliged to answer, and do it in plain language, and in as few words as possible. If you can better illustrate what you mean by models, etc., to a jury, do so. A juryman once said to me: "In medical cases we want the witness to use plain language, and well illustrated if possible." In conclusion allow me to summarize the following points of interest from the foregoing remarks.

1. In accidental injuries, operative cases, as well as in general

diseases of the eye, make a thorough examination of the parts involved. Keep a record describing in detail all the parts injured, and your opinion as to any previous pathological conditions that are present now, and may have existed prior to the present injuries sustained, and the relation they bear to each other as regards the impairment of vision for the present or future.

2. If you are not capable of skillfully using the ophthalmoscope, have a consultation with some one who is expert in its use, and do it immediately after you are first called to see the case.

3. It is necessary to be well versed in the anatomy and physiology of the eye. Study it in health and disease, so as to be able to distinguish between normal and pathological conditions, and especially try to have lots of experience with cases, for if you lack this particular, you had better not approach a witness stand.

4. Consider well the interests of the plaintiff as well as the defendant. State nothing but facts, and in as few words as possible.

5. Always get the consent of the proper authorities before performing any operations, and never promise your patients any definite results, as to how soon they will or will not recover from any injury or operation. I am speaking from experience which after all is the best teacher.

GRAFTING IN EPITHELIOMA.

By PETER D. KEYSER, M. D., Philadelphia, Pa.

The method of transplantation in blepharoplastics has been, though in many cases brilliant in its results and pleasing to the surgeon, not always a source of gratification and delight to the patient on account of the scars left, not only, on the original defect but in the place or places from which the new piece or pieces were taken to cover the blemish. In many cases ugly contractions have been created by the operation and in the process of healing.

These remaining defects have been specially marked in cases of the removal of epithelioma and scar contractions from burns of the eyelids, and to be relieved of these, I have for the past five years been operating in all such by the method of grafting large pieces of thin skin with great success. By this method it has been seen that the edges of the graft and wound so completely unite, that in time, all line of demarcation is gradually removed and any scars hardly perceptible.

Three years ago I removed an epithelioma from the inner canthus of the eye, filling in the wound with a large graft of thin skin shaved from the arm with such success that there has been no return of the disease to this time.

The case was so flattering that I have since operated upon three other cases with the same favorable issue.

As it would occupy too much space to represent all, I present one which was very interesting from the point of fact that the epithelioma had eaten into the nasal bone, which was carefully scraped of all diseased tissue before the graft was laid on, and which recovered equally as well as those cases where only the skin and underlying tissue was attacked.

George F. R., aet. fifty-nine, came to my clinic in the Wills Eye Hospital, February 16, 1895, with epithelioma, inner canthus, left eye, giving the history that it was of six months duration only, and that it had grown quite fast. See Fig. 1. On March 1, 1895, after dissecting out carefully and entirely all trace of the epithelioma, it was found that there was a point over the nasal bone where the disease had gone through the flesh to the bone. After scraping this part well the graft was laid on. Everything went well and Fig. 2, shows him as he is to-day, now fifteen months after the operation. There is some contraction of the lids which does not interfere with the use of the eye nor cause pain nor hindrance from work. Before the operation the use of the eye was entirely lost, as he was obliged to wear a bandage over it all the time. My colleagues, Doctors Fisher and Berens, have at my suggestion treated epithelioma in the same way with equally good success.

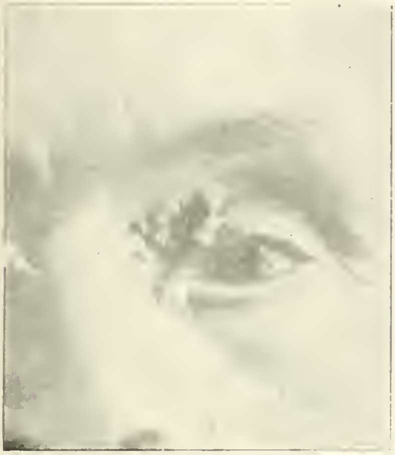

FIG. 1.

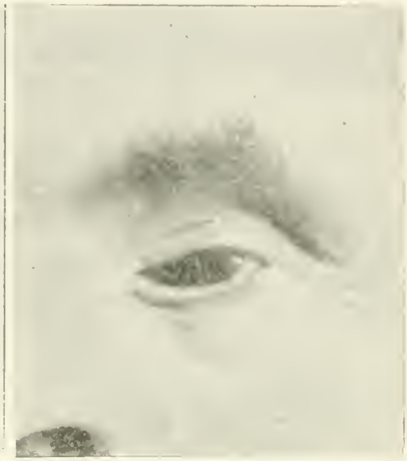

FIG. 2.

It is not my purpose at this time to go into the after-treatment of the wound and graft, as that was done in the report of my first case, as described in the Journal of the American Medical Association, Sept. 1, 1894, and also mentioned in the articles on the process of grafting by many writers, and in my paper on blepharoplastics in the Wills Eye Hospital Reports, 1895.

But from all that I have seen, I am lead to accept that grafting is an easy and successful method of treating epithelioma, especially in its early development.

It is very necessary that care be taken in the operation to remove completely all of the diseased tissue before placing the graft in position.

One point in the after-treatment, I desire to mention, which I have found very advantageous, that is, not to let the oiled silk or any other covering touch the graft, but to build a wall with rolled lint or cloth around the wound before the antiseptic covering is laid over. In this way nothing can stick to the graft and it can be easily examined at any time without danger.

A CASE OF SYMPATHETIC OPHTHALMIA.

By HOWARD F. HANSELL, M.D., Philadelphia, Pa.
Clinical Professor of Ophthalmology Jefferson Medical College, Professor of Ophthalmology, Philadelphia Polyclinic, etc.

A short record of the history, and a report of the outcome of a case of almost complete blindness during a period of ten years from injury to one eye and sympathetic disease of the other, may not be without interest. The report does not throw any light on the pathogenesis of the disease nor does it add testimony to any of the theories advanced, but furnishes a clinical history that must be a type of many others. Examination of eyes enucleated for sympathetic disease do not uphold the migration theory as announced by Deutschmann. Careful, accurate, thorough microscopic investigations have been made by Burgeois (Rec. d'Ophthal. July, 1895), by Bach (Arch. of Ophthalmology, Oct. '95,) by DeSchweinitz (Jour. Amer. Med. Asso. Oct 25, 1895), and others without discovering micro-organisms in process of trans mission. Collins seems to be very near the truth when he says (The Lancet, London, Nov. 16, 1895): "The reflection that sympathetic ophthalmia is in some way merely corallary to the law of symmetry and the recollection of the selective powers exerted by similar tissues may supply a fruitful working hypothesis." However doubtful and uncertain the means of transmission or the thing transmitted the fact is unquestionable that injuries to the ciliary region are prone to create a destructive inflammation of the fellow eye, often fatal to sight but occasionally offering a chance of escape from permanent blindness and justifying a final effort even after similar attempts have been unsuccessful.

Miss P., applied in October, 1895, at the Jefferson Hospital and gave the following history. At the age of ten years she lost the left eye from traumatic inflammation. Two months later the right became inflamed and in a short time vision was reduced to light perception. During the following year two iridectomies were made in the left eye without improvement of vision. Sometime in the course of the next few years a third attempt was equally unavailing. At the time of examination the R. was atrophied, no light perception and no inflammation. L., iris and cornea were in contact excepting a small triangular space near the center of the cornea containing about ½ minim of aqueous humor; no pupil, total posterior synechia; Tn; transparency of the lens could not be determined; perception of moving objects. The patient with a full understanding that the chances were decidedly against her, earnestly requested that another attempt to restore some vision should be made. Incising the cornea at the margin of the minute remnant of the anterior chamber, the anterior layers of the iris and an exceedingly limited portion of the uveal coat were with some difficulty removed. Healing was uninterrupted. Four months later vision had increased to $\frac{20}{200}$ and the patient was enabled to read through a magnifying glass equal to 8D.

A CONGENITAL CATARACT FAMILY.

By HOWARD F. HANSELL, M.D.

Attention has been called by Dr. John L. Dickey of Wheeling, W. Va., in a recent number of *The Medical News*, to a family in which cataract had appeared in several members. Through the kindness of Dr. Edward Kerr, of Downingtown, Pa. I have had the privilege of seeing two members, and operating on one in the Chester Co. Hospital, of a family conspicuous for congenital opacities of the lens. The first patient in the family as far as is known was the great-grandfather of J. B. (my patient). He had ten children. One daughter (grandmother) had double congenital cataract and was operated on successfully. This daughter had six children.

1. Son. No cataract.
2. Daughter. Double cataract.
3. Son. No cataract.
4. Daughter. No cataract.
5. Son. Double cataract.
6. Daughter. Double cataract.

The first daughter had three children. The first and third died in infancy and had no cataract. The second child is now a boy of two years of age and has double cataract.

THE OPHTHALMIC RECORD,

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Section of Ophthalmology, A. M. A.

Dr. Allport, Secretary of the Atlanta meeting, had prepared a splendid program, only a part of which could be carried out because of the absence of so many who had promised papers. The attendance was small, but the work done was good. Chairman Howe was absent, but cabled, from Paris, expressions of interest in the meeting. Howe is a good fellow, but he set a bad precedent in allowing anything to take him away from the meeting over which he had been elected to preside.

We will begin in No. 1, Vol. VI, the publication in abstract, of the scientific work done in the Section Meeting at Atlanta.

Dr. G. E. de Schweinitz, of Philadelphia, was made Chairman, and Dr. H. M. Starkey, of Chicago, Secretary, of the next meeting, which will be held in Philadelphia, June, 1897. The place of the next meeting will strengthen the work to be done by the officers, in preparation for same; and we may expect a larger and better meeting than any that has ever been held since the Section was organized. The RECORD will gladly aid the officers in any way, and at any time, in making the Philadelphia meeting just what it should be.

Volume V. of the Record

Closes with this issue. Its 491 pages present to the readers as much practical matter as can be found in any ophthalmic journal published in any language. The most advanced oculists in the country are both subscribers and contributors. Many have been kind enough to commend the Record because of its intensely practical nature.

The index to be found in this issue shows what has appeared in the volume, and who the men are who have expressed their views on the various subjects considered in its pages.

The subscription and advertising patronage has been enough from the beginning to pay expenses of publication. Anxious to improve the Record still further, we desire to greatly increase our subscription list, for two reasons: we want the money that would come from new subscribers; and we want the increase of advertising patronage that would follow. To both advertisers and subscriber "value received" will be given. Will old subscribers speak, as occasion may offer, a few kind words for the Record, to non subscribers?

Special Editions

Of the Record, of which this issue is the second, promise well. The Tennessee Edition was appreciated both at home and abroad. This, the Eastern Pennsylvania Edition, is brim-full of good things, and it has all been gotten up under the depressing influence of summer heat. We propose continuing this feature of the work unless the added cost shall outstrip the hoped-for additional income. Odd numbers (1, 3, 5, etc.), will be general editions, in which will appear contributions from any and all sections of the country, and from foreign countries; even numbers (2, 4, 6, etc.), will be special editions.

Dr. Wm. Thomson

Has resigned the Professorship of Ophthalmology in Jefferson Medical College, stating as his reason for so doing that clinical teaching, to which he had been accustomed so many years, was far more congenial to him than didactic teaching. His recent election as surgeon to the Wills Eye Hospital affording him abundant opportunity for clinical work, doubtless led him to offer his resignation in Jefferson. The chair thus left vacant is a desirable one, and the man who may be called to fill it will be most fortunate.—Later: A special telegram announces that Dr. de Schweinitz has been elected.

Dr. W. E. Baxter.

Formerly of Bangor, Me., has recently returned from a European trip of several months, attending the ophthalmic clinics, and has located at 553 Boylston Street, Boston. The reader will remember him as an occasional contributor to the pages of the Record.

Dr. W. C. Pipino.

Of Des Moines, Iowa, while out riding a few weeks ago was thrown from his horse and received an injury from which he died a few days later.

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